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true translation to the best of my knowledge and belief of Japanese Patent
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[NAME OF DOCUMENT] SPECIFICATION

[TITLE OF THE INVENTION] APPARATUS, METHOD AND PROGRAM FOR
CONTROLLING EDITING IMAGE DISPLAY

5 [NAME OF DOCUMENT] SCOPE OF CLAIMS

[CLAIM 1] An apparatus for controlling an editing image display,
characterized by comprising:

a material capture means for capturing material data;

an edit processing means for recording the material data captured by the
10 material capture means and performing edit processing on the recorded material
data;

an edited-outputting signal generation means for generating a
outputting signal based on the material data recorded in the edit processing means
or the material data being subjected to the edit processing and outputting the
15 outputting signal;

a user interface unit for generating an operation signal according to an
editing operation; and

an editing control means for controlling working of the material capture
means, the edit processing means, and the edited outputting signal generation
20 means based on the operation signal,

wherein the editing control means controls the edited outputting signal
generation means, to cause the edited outputting signal generation means to
output the transmission signal for displaying the material data in a manner that
allows items of the material data which are combined with frame rate information
25 as associated information and items of the material data which are not combined
with the the associated information to be distinguished from each other.

[CLAIM 2] The apparatus according to Claim 1, characterized in that the
editing control means includes a material administration representation for
displaying a list of items of the material data, and displays the material data in a

manner that allows the items of the material data which are combined with the associated information and the items of the material data which are not combined with the associated information to be distinguished from each other in the material administration representation.

5 [CLAIM 3] The apparatus according to Claim 1, characterized in that the editing control means includes a reproduction order representation for arranging items of the material data in a reproduction order to produce a content, and displays the material data in a manner that allows the items of the material data which are combined with the associated information and the items of the material data which are not combined with the associated information to be distinguished from each other in the reproduction order representation.

10 [CLAIM 4] The apparatus according to Claim 1, characterized in that the editing control means includes a reproduction time order representation for allocating the items of the material data along a time axis to produce a content, and displays the material data in a manner that allows the items of the material data which are combined with the associated information and the items of the material data which are not combined with the associated information to be distinguished from each other in the reproduction order representation.

15 [CLAIM 5] The apparatus according to Claim 1, characterized in that the editing control means sets a speed range available for reproduction of the material data based on the associated information, and controls the edited outputting signal generation means to cause the edited outputting signal generation means to output the outputting signal for displaying the set speed range available for reproduction.

20 [CLAIM 6] The apparatus according to Claim 5, characterized in that the editing control means includes a material administration representation and displaying a list of items of the material data, and displays the set speed range

available for reproduction in the material administration representation.

[CLAIM 7] The apparatus according to Claim 5, characterized in that the editing control means includes a reproduction order representation for arranging items of the material data in a reproduction order to produce a content, and displays the set speed range available for reproduction in the reproduction order representation.

[CLAIM 8] The apparatus according to Claim 5, characterized in that the editing control means includes a reproduced image representation of the material data, and displays the set speed range available for reproduction in the reproduced image representation.

[CLAIM 9] The apparatus according to Claim 8, characterized in that the control means includes, within a representation of the speed range available for reproduction, an indication for indicating a reproduction speed.

[CLAIM 10] The apparatus according to Claim 5, characterized in that the editing control means includes a reproduction time order representation for allocating items of the material data along a time axis to produce a content, and displays a representation width of the material data being altered according to reproduction time calculated on the basis of the reproduction speed in the reproduction time order representation.

[CLAIM 11] The apparatus according to Claim 5, characterized in that the editing control means includes a reproduced image representation of the material data and a reproduction time order representation for allocating items of the material data along a time axis to produce a content, displays the set speed range available for reproduction in the reproduced image representation, includes, within a representation of the speed range available for reproduction, an indication for indicating a reproduction speed, and displays a representation width of the material data being altered according to reproduction time calculated

on the basis of the reproduction speed in the reproduction time order representation,

and in that when the operation means alters the representation width of the material data in the reproduction time order representation, a display position of the indication is moved according to the operation; and when the display position of the indication is altered, the representation width of the material data in the reproduction time order representation is altered according to the operation.

[CLAIM 12] The apparatus according to Claim 5, characterized in that, when the material data is set to be reproduced at a reproduction speed within the speed range available for reproduction, the editing control means controls the edited outputting signal generation means to cause the edited outputting signal generation means to output a outputting signal based on the material data reproduced at the set reproduction speed to reproduce the material data at the set reproduction speed.

[CLAIM 13] A method for controlling an editing image display, characterized by comprising the steps of:

capturing material data;

performing an edit processing on the captured material data; and

displaying, in the edit processing, an image based on the captured

material data or material data being subjected to the edit processing,

wherein the material data is displayed in the edited image in a manner that allows items of the material data which are combined with frame rate information as associated information and items of the material data which are not combined with the the frame rate information to be distinguished from each other.

[CLAIM 14] The method according to Claim 13, characterized in that a material administration representation for displaying a list of items of the material

data is provided, and the material data is displayed in a manner that allows the items of the material data that are combined with the associated information and the items of the material data that are not combined with the associated information to be distinguished from each other in the material administration representation.

[CLAIM 15] The method according to Claim 13, characterized in that a reproduction order representation for arranging items of the material data in a reproduction order to produce a content is provided, and the material data is displayed in a manner that allows the items of the material data that are combined with the associated information and the items of the material data that are not combined with the associated information to be distinguished from each other in the reproduction order representation.

[CLAIM 16] The method according to Claim 13, characterized in that a reproduction time order representation for allocating items of the material data along a time axis to produce a content is provided, and the material data is displayed in a manner that allows the items of the material data that are combined with the associated information and the items of the material data that are not combined with the associated information to be distinguished from each other in the reproduction time order representation.

[CLAIM 17] The method according to Claim 13, characterized in that a speed range available for reproduction of the material data is set based on the associated information, and the set speed range available for reproduction is displayed.

[CLAIM 18] The method according to Claim 17, characterized in that a material administration representation for displaying a list of items of the material data is provided, and the set speed range available for reproduction is displayed in the material administration representation.

[CLAIM 19] The method according to Claim 17, characterized in that a reproduction order representation for arranging items of the material data in a reproduction order to produce a content is provided, and the set speed range available for reproduction is displayed in the reproduction order representation.

5 [CLAIM 20] The method according to Claim 17, characterized in that a reproduced image representation of the material data is provided, and the set speed range available for reproduction is displayed in the reproduced image representation.

10 [CLAIM 21] The method according to Claim 20, characterized in that an indication for indicating a reproduction speed is provided within a representation of the speed range available for reproduction,.

15 [CLAIM 22] The method according to Claim 17, characterized in that a reproduction time order representation for allocating items of the material data along a time axis to produce a content is provided and a representation width of the material data being altered according to reproduction time calculated on the basis of the reproduction speed is displayed in the reproduction time order representation.

20 [CLAIM 23] The method according to Claim 17, characterized in that a reproduced image representation of the material data and a reproduction time order representation for allocating items of the material data along a time axis to produce a content are provided, the set speed range available for reproduction is displayed in the reproduced image representation, an indication for indicating a reproduction speed is provided within a representation of the speed range available for reproduction, and a representation width of the material data being altered according to reproduction time calculated on the basis of the reproduction speed is displayed in the reproduction time order representation,

25 and in that when the operation means alters the representation width of

the material data in the reproduction time order representation, a display position of the indication is moved according to the operation; and when the display position of the indication is altered, the representation width of the material data in the reproduction time order representation is altered according to the operation.

5 [CLAIM 24] The method according to Claim 17, characterized in that when the material data is set to be reproduced at a reproduction speed within the speed range available for reproduction, a signal based on the material data reproduced at the set reproduction speed is output to reproduce the material data at the set reproduction speed.

10 [CLAIM 25] A program for allowing a computer to carry out a method for controlling an editing image display, the method comprising the steps of:
 setting, when frame rate information is obtained from material data to be edited, a speed available for reproduction based on the frame rate information;
 performing display control according to the frame rate information;
15 displaying, when a reproduction speed is set, the set reproduction speed;
 calculating, based on the set reproduction speed, reproduction time in the case of reproducing the material data at the set reproduction speed;
 performing display control according to the reproduction time; and
 displaying reproduced images of the material data at the indicated
20 reproduction speed.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[TECHNICAL FIELD TO WHICH THE INVENTION BELONGS]

25 The invention relates to an apparatus, a method, and program for controlling an editing image display. Particularly, an edit processing is performed using captured material data. In the edit processing, an image based on the captured material data or a material data being subjected to the edit processing is displayed. The material data is displayed in the edited image in a

manner that allows items of the material data that are combined with frame rate information as associated information and items of the material data which are not combined with the the frame rate information to be distinguished from each other. Further, display control based on the combined frame rate information is performed.

[0002]

[PRIOR ART]

From the past, in generation of contents of image or image audio used for broadcasting, a distribution via a communication network, circulation by recording medium, or the like, a content having its motion speed altered has been used in addition to a content generated at a predetermined reference frame rate in order to obtain effects intended by a creator.

[0003]

In generation of such content having its motion speed altered, a higher frame rate as compared to the reference frame rate is set to generate a content, for example, and the content is reproduced at the reference frame rate to thereby produce a content with a low motion speed. Alternatively, a lower frame rate as compared to the reference frame rate is set to generate a content, and the content is reproduced at the reference frame rate to thereby produce a content with a high motion speed. Further, by adjusting the frame rate set for generation of the content or the frame rate for reproduction of the content, the motion speed of the content can be freely altered.

[0004]

Thus, by performing an edit processing using the content having its motion speed altered and the content generated at the reference frame rate, a content that is capable of obtaining an effect intended by a creator is generated.

[0005]

It has been proposed in Patent Document 1 that the video camera that is

capable of compressing or extending a time axis in order to generate a content having its frame rate altered.

[0006]

[Patent Document]

5 Japanese Patent Application Laid-open No. HEI 11-177930

[0007]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

Incidentally, in a case of performing the edit processing using the content generated at the reference frame rate and the content having its motion speed altered as material as described above, it is not easily determined which frame rate is used to generate each content, by merely displaying an image of the content. Further, in a case of performing a speed change processing on the content having its motion speed altered, it is difficult to determine whether or not the speed change processing can be easily performed without causing any deterioration in image quality. If the frame rate that is set (hereinafter, referred to as, "set frame rate") is 10 times the reference frame rate, when the content generated at the set frame rate is reproduced at the reference frame rate, a motion speed of the content becomes one-tenth. Here, it is conceivable that since the set frame rate is 10 times the reference frame rate, when the creator wants to reproduce the content at a one-fifth motion speed, the speed change can be easily performed without any deterioration in image quality by performing a frame-skipping for each frame. However, it is difficult to determine whether or not the speed change can be easily performed without any deterioration in image quality, based on merely the displayed image.

25 [0008]

In this regard, the present invention provides an apparatus and method for controlling an editing image display that are capable of easily performing an

edit processing using a material generated at the reference frame rate and a material having its frame rate altered.

[0009]

[MEANS FOR SOLVING THE PROBLEMS]

5 According to the present invention, there is provided an apparatus for controlling an editing image display including: a material capture means for capturing material data; an edit processing means for recording the material data captured by the material capture means and performing edit processing on the recorded material data; an edited outputting signal generation means for
10 generating an outputting signal based on the material data recorded in the edit processing means or the material data being subjected to the edit processing and outputting the outputting signal; a user interface unit for generating an operation signal according to an editing operation; and an editing control means for controlling working of the material capture means, the edit processing means, and
15 the edited outputting signal generation means based on the operation signal, wherein the editing control means controls the edited outputting signal generation means, to cause the edited outputting signal generation means to output the transmission signal for displaying the material data in a manner that allows items of the material data which are combined with frame rate information as
20 associated information and items of the material data which are not combined with the the associated information to be distinguished from each other.

[0010]

 A method for controlling an editing image display includes: capturing material data; performing an edit processing on the captured material data; and
25 displaying, in the edit processing, an image based on the captured material data or material data being subjected to the edit processing, wherein the material data is displayed in the edited image in a manner that allows items of the material data

which are combined with frame rate information as associated information and items of the material data which are not combined with the the frame rate information to be distinguished from each other.

[0011]

5 A program for allowing a computer to carry out a method for controlling an editing image display, said method including the steps of: setting, when frame rate information is obtained from material data to be edited, a speed available for reproduction based on the frame rate information; performing display control according to the frame rate information; displaying, when a reproduction speed is set, the set reproduction speed; calculating, based on the set reproduction speed, reproduction time in the case of reproducing the material data at the set reproduction speed; performing display control according to the reproduction time; and displaying reproduced images of the material data at the indicated reproduction speed.

15 [0012]

 In this invention, material data is captured and an edit processing is performed using the captured material data. In the edit processing, an image based on the captured material data or a material data being subjected to the edit processing is displayed. The material data is displayed in the edited image in a manner that allows items of the material data that are combined with frame rate information as associated information and items of the material data which are not combined with the the frame rate information to be distinguished from each other. In the edited image, a material administration representation for displaying a list of items of the material data is provided, and the material data is displayed in a manner that allows the items of the material data that are combined with the associated information and the items of the material data that are not combined with the associated information to be distinguished from each other in

the material administration representation. Further, a reproduction order representation for arranging items of the material data in a reproduction order to produce a content is provided, and the material data is displayed in a manner that allows the items of the material data that are combined with the associated

5 information and the items of the material data that are not combined with the associated information to be distinguished from each other in the reproduction order representation. Further, a reproduction time order representation for allocating items of the material data along a time axis to produce a content is provided, and the material data is displayed in a manner that allows the items of

10 the material data that are combined with the associated information and the items of the material data that are not combined with the associated information to be distinguished from each other in the reproduction time order representation. Further, a speed range available for reproduction of the material data is set based on the associated information, and the set speed range available for reproduction

15 is displayed. This speed range available for reproduction is displayed in the material administration representation for displaying a list of items of the material data, the reproduction order representation for arranging items of the material data in a reproduction order to produce a content, and the reproduced image representation of the material data. An indication for indicating a reproduction

20 speed is provided within a representation of the speed range available for reproduction. The reproduction time order representation for allocating items of the material data along a time axis to produce a content is provided and a representation width of the material data being altered according to reproduction time calculated on the basis of the reproduction speed is displayed in the

25 reproduction time order representation. Further, when an operation that alters the representation width of the material data in the reproduction time order representation, a display position of the indication is moved according to the

operation; and when the display position of the indication is altered, the representation width of the material data in the reproduction time order representation is altered according to the operation.

[0013]

5 [EMBODIMENT MODE OF THE INVENTION]

Hereinafter, a description will be given on an embodiment of the present invention. Fig. 1 shows an entire configuration of a content-editing system for an image content and/or an audio content. An imaging apparatus 10 generates image data having its frame rate altered and combines associated information including frame rate information indicating a frame rate of the image data with this image data to supply an editing apparatus 30 with the combined ones as material data DTm. When the imaging apparatus 10 is provided with an audio input apparatus 20, the imaging apparatus 10 generates audio data to supply the editing apparatus 30 with the audio data together with the associated information as material data DTm. The material data DTm may also be supplied from an apparatus other than the imaging apparatus 10.

[0014]

The editing apparatus 30 performs edit processing on the supplied material data DTm to produce and output content-data DC. The editing apparatus 30 also produces an image signal Svm concerning the editing and supplies an edited-image-displaying apparatus 40 with it, to thereby check a progress, result and the like of the edit processing of an image through a displayed image on the edited-image-displaying apparatus 40. Similarly, the editing apparatus 30 produces an audio signal Sam concerning the editing and supplies an edited-audio-outputting apparatus 41 with it to thereby check a progress, result and the like of the edit processing of an audio through an audio output from the editing-audio-transmitting apparatus 41.

[0015]

Fig. 2 shows a configuration of the imaging apparatus 10. Light that is incident through an imaging lens system 11 enters an imaging unit 12, and an object image is formed on an image surface of an image pickup device such as a charge coupled device (CCD) provided within the imaging unit 12. The image pickup device generates imaging charges of the object image through photoelectric conversion. In addition, the generated imaging charges are read out based on a driving signal CR from a timing generator 142, which will be described later, and an imaging signal Sp having a frame rate that corresponds to the driving signal CR is generated to be supplied to a camera processing circuit 131 in a signal processor 13.

[0016]

Based on a timing signal CT received from the timing generator 142, the camera processing circuit 131 performs various signal processes at timings synchronized with the imaging signal Sp. The signal processes include a process for reducing noise components from the imaging signal Sp by means of correlated dual sampling or the like, a process for converting the noise-reduced imaging signal Sp into digital image data, a clamp process of the image data, shading correction, pilling-up of deficiency in the image pickup device, γ correction, a contour calibration process, and a knee correction process, for example. Further, the camera processing circuit 131 performs other various signal processes under the process conditions based on an operation control signal CS received from an imaging control circuit 141 of a controller 14. As described above, an image data DV obtained through various signal processes by the camera processing circuit 131 is supplied to an outputting unit 15.

[0017]

The timing generator 142 of the controller 14 generates the driving

signal CR according to the operation control signal CS from the imaging control circuit 141 and supplies the imaging unit 12 with the driving signal CR, thereby altering a reading-out frequency of the imaging charges in the imaging unit 12 to control a frame rate of the imaging signal Sp to be set to a set frame rate FRs
5 based on an operation signal PSa from a user interface unit 16. For example, a frame frequency of a reference frame rate FRr is set to 59.94Hz or 29.97Hz in an NTSC system, and 50Hz or 25Hz in a PAL system. When an operation of setting the set frame rate FRs to the n times the reference frame rate FRr, the frame rate of the imaging signal Sp is controlled to be equal to the n times the
10 reference frame rate FRr.

[0018]

The timing generator 142 also generates the timing signal CT synchronized with the driving signal CR and supplies the camera processing circuit 131 and the audio processing circuit 132 with the timing signal CT. The
15 timing generator 142 further generates associated information DM including the set frame rate FRs that is the frame rate of the image data DV as frame rate information, and supplies the outputting unit 15 with the associated information DM.

[0019]

The imaging control circuit 141 of the controller 14 is connected with
20 the user interface unit 16. When the imaging apparatus 10 performs a switching operation and a frame rate alteration operation, the user interface unit 16 generates an operation signal PSa according to these operations and supplies the imaging control circuit 141 with the operation signal PSa. When receiving the
25 operation signal PSa from external equipment, the user interface unit 16 also supplies the imaging control circuit 141 with the operation signal PSa.

[0020]

The imaging control circuit 141 generates the operation control signal CS based on the operation signal PSa received from the user interface unit 16 such that the imaging apparatus 10 operates according to the operation signal PSa, and supplies the camera processing circuit 131 and the timing generator 142 with the operation control signal CS.

[0021]

An audio processing circuit 132 is supplied with an analog audio signal Sa from the audio input apparatus 20. The audio processing circuit 132 also performs a sampling process on the analog audio signal Sa based on the timing signal CT received from the timing generator 142 to generate digital audio data DA and supply the outputting unit 15 with the digital audio data DA.

[0022]

The outputting unit 15 combines the image data DV and the audio data DA with the associated information DM to generate material data DTm and supplies the editing apparatus 30 with the material data DTm. When the material data DTm or a recording signal produced on the basis of the material data DTm is recorded on recording medium, the material data DTm may be supplied to the editing apparatus 30 through the recording medium by reproducing the material data DTm or the recording signal produced on the basis of the material data DTm recorded on the recording medium in the editing apparatus 30.

[0023]

Here, in the case of combining the image data DV and the audio data DA with the associated information DM, when the image data DV and the audio data DA are compressed to generate the material data DTm as a data stream, the associated information DM is inserted into the data stream of image or a header of the data stream.

[0024]

Further, when an SDI format standardized as SMPTE (Society of Motion Picture and Television Engineers) 259M (Television-10-Bit 4:2:2 Component and 4fsc Composite Digital Signals-Serial Digital Interface) is used to transfer
5 non-compressed image and audio data, or when an SDTI format standardized as SMPTE 305M (Television-Serial Data Transport Interface (SDTI)) or an SDTI-CP format standardized as SMPTE 326M (Television-SDTI Content Package Format (SDTI-CP)) obtained by further defining the SDTI format is used to transfer compressed image and audio data, the associated information
10 DM is inserted into a signal having each format as UMID data standardized as SMPTE 330M(Television-Unique Material Identifier (UMID)).

[0025]

Incidentally, the imaging apparatus 10 described above alters the read-out timing of the imaging charges in the imaging unit 12 in order to obtain
15 the imaging signal Sp having the set frame rate FRs. However, even when the read-out timing of the imaging charges in the imaging unit 12 is not altered, the imaging signal Sp having the set frame rate FRs may be generated. That is, the image data DV having the set frame rate FRs can be generated by generating image data DVa having a constant frame rate higher than the set frame rate FRs
20 and extracting from the image data DVa only a portion of image data corresponding to the set frame rate FRs. Fig. 3 shows a configuration in such a case. In Fig. 3, parts corresponding to those of Fig. 2 are denoted by the same reference numerals, and the detailed description thereof is omitted.

[0026]

25 A timing generator 182 in a controller 18 generates a driving signal CRa according to the maximum value of the set frame rate FRs that is set through the user interface unit 16 and supplies the imaging unit 12 with the driving signal

CRA. Based on the driving signal CRA, the imaging unit 12 generates an imaging signal Spa having a fixed frame rate FRq higher than the reference frame rate FRs. The imaging unit 12 then supplies the camera processing circuit 131 in a signal processor 17 with the imaging signal Spa. When the set frame rate
5 FRs may be altered up to n times the reference frame rate FRr, the imaging unit 12 generates the imaging signal Spa having a frame rate n times the reference frame rate FRr, and supplies the camera processing circuit 131 with the imaging signal Spa.

[0027]

10 The timing generator 182 also generates a timing signal CTa synchronized with the driving signal CRA and supplies the camera processing circuit 131 and the audio processing circuit 132 in the signal processor 17 and an effective frame signal generation circuit 183 with the timing signal CTa.

[0028]

15 The camera processing circuit 131 supplied the image data DVa having the fixed frame rate FRq generated based on the imaging signal Spa to an effective data selection circuit 171. The audio signal processing circuit 132 supplies an audio data DAa obtained by carrying out a sampling based on the timing signal CTa having a fixed frequency to the effective data selection circuit
20 171.

[0029]

An imaging control circuit 181 generates a set information signal CF indicating the set frame rate FRs based on the operational signal PSa from the user interface unit 16 and supplies the effective frame signal generation circuit
25 183 with the set information signal CF.

[0030]

The effective frame signal generation circuit 183 extracts data on a

frame basis from the image data DVa based on a ratio of the frame rate FRq of the image data DVa previously fixed to a predetermined value to the set frame rate FRs indicated in the set information signal CF and generates an extraction control signal CC for generating image data DV having the set frame rate FRs.

- 5 The effective frame signal generation circuit 183 also synchronizes the extraction signal CC with the timing signal CTa and supplies the effective data selection circuit 171 with the synchronized extraction control signal CC. For example, when the frame rate FRq of the image data DVa is n times the reference frame rate FRr and the set frame rate FRs is n/2 times the reference frame rate FRr, the
- 10 effective frame signal generation circuit 183 generates the extraction control signal CC for performing data extraction on a frame basis every other frame from the image data DVa and supplies the effective data selection circuit 171 with the extraction control signal CC synchronized with the timing signal CTa. The effective frame signal generation circuit 183 further generates the associated
- 15 information DM having the set frame rate FRs as the frame rate information based on the set information signal CF and supplies the outputting unit 15 with the associated information DM.

[0031]

- The effective data selection circuit 171 extracts the image data DVa and
- 20 the audio data DAa of the frame indicated by the extraction control signal CC and supplies the outputting unit 15 with them as the image data DV and the audio data DA. In addition, although not shown, the effective frame signal generation circuit 183 may supply the effective data selection circuit 171 with the associated information DM including the set frame rate FRs as the frame rate information,
- 25 and the effective data selection circuit 171 may perform frame-skipping on the audio data DAa according to a ratio of the set frame rate FRs to a frame rate when the audio data DAa is generated. In a case where the frame rate FRq

when the audio data DAa is generated is n times the reference frame rate FRr and the set frame rate FRs is $n/2$ times the reference frame rate FRr, the effective data selection circuit 171 performs the frame-skipping on the audio data DAa every other sample. In this case, since an interval of the frame-skipping may be shortened as compared to a case of performing the frame-skipping on the audio data DAa on a frame basis, audio having an excellent sound quality may be obtained based on the audio data DA.

[0032]

Thus, the image data DVa having a fixed frame frequency makes unnecessary the alteration of operation frequencies in the imaging unit 12 and the camera processing circuit 131 of the signal processor 17. This allows configurations of the imaging unit 12 and the camera processing circuit 131 to be made simpler. Since the image data DV having the set frame rate FRs can be generated by only extracting data on a frame basis from the image data DVa, the image data DV having a desired set frame rate FRs can be easily generated from the image data DVa.

[0033]

Further, the imaging apparatus may be provided with a video memory or an adder and a divider to generate the image data DV by adding the image data every predetermined frames. In this case, a variable range of a frame rate of the imaging signal Sp can be made narrower. That is, by adding the imaging signal Sp of n frames and dividing the signal level by n , the signal having a frame rate $1/n$ times the imaging signal Sp can be obtained even when a frame rate of the imaging signal Sp is not divided by n .

[0034]

Figs. 4 and 5 are diagrams showing a relationship between the image data DV generated by the imaging apparatuses 10, 10a and the associated

information DM. When the set frame rate FRs is set to the one equal to or twice the reference frame rate FRr as shown in Fig. 4A, the associated information DM that includes the frame rate information DM-FRs indicating the set frame rate FRs, as shown in Fig. 4C, is combined with the image data DV as shown in Fig. 4B (in the figures, frame images based on the image data DV are shown). Fig. 4D illustrates a relationship between time and the frame images. The frame rate information DM-FRs may include a magnification of the set frame rate FRs with respect to the reference frame rate FRr in addition to the set frame rate FRs. Fig. 4C and subsequent figures show the frame rate information DM-FRs together with the magnification.

[0035]

When the set frame rate FRs is set to the one equal to or half as much as the reference frame rate FRr as shown in Fig. 5A, the associated information DM that includes the frame rate information DM-FRs indicating the set frame rate FRs, as shown in Fig. 5C is combined with image data DV as shown in Fig. 5B (in Fig. 5B, frame images based on the image data DV are shown). Fig. 5D illustrates a relationship between time and the frame images.

[0036]

Next, a description will be given on the editing apparatus 30. Fig. 6 shows a configuration of the editing apparatus 30. The material data DTm supplied to the editing apparatus 30 is supplied to an information detection circuit 311 in a material capture unit 31. The information detection circuit 311 detects the associated information DM from the material data DTm. The detected associated information DM is supplied to a database-processing circuit 312. The database-processing circuit 312 also is also supplied with image data DV and audio data DA included in the material data DTm.

[0037]

The database-processing circuit 312 records the image data DV, the audio data DA, and the associated information DM detected in the information detection circuit 311 on a data recording apparatus 321 in an edition processing unit 32 with the image data DV and the audio data DA being linked to the associated information DM. The database-processing circuit 312 generates database information DB that allows contents of material data to be easily checked on the basis of the associated information DM and the image data DV and the audio data DA linked to the associated information DM, which have been recorded on the data recording apparatus 321. The generated database information DB is then supplied to an editing control unit 33. The database information DB is constituted of information including information for allowing content of material data to be recognized (for example, thumbnails), a time length of the material data, a set frame rate FRs, and a recorded location on the data recording apparatus 321, for example.

[0038]

The editing control unit 33 generates image data DVg for allowing edit processing to be carried out under graphical user interface (GUI) environment and image data DVi for allowing representation of content of the database information. The editing control unit 33 then supplies an image-outputting signal generation circuit 351 with the image data DVg and DVi. The image-outputting signal generation circuit 351 generates an image signal Svm based on the supplied image data DVg, DVi and outputs it to the edited-image-displaying apparatus 40. Thus, supplying the edited-image-displaying apparatus 40 with the image signal Svm allows information on what kind of the material data is recorded or the like to be displayed on a screen of the edited-image-displaying apparatus 40.

[0039]

The editing control unit 33 also controls post-production process. Specifically, when an operational signal PSe that utilizes representation under GUI environment is supplied from a user interface unit 34 connected with the editing control unit 33 and the operational signal PSe indicates the selection of
5 any kind of the material data, the editing control unit 33 generates a reading control signal RC according to the operational signal PSe and supplies a write/read processing circuit 322 in the edition processing unit 32 with the reading control signal RC. When the operational signal PSe relates to an editing operation such as processing and linkage of the read material data, the editing
10 control unit 33 generates an editing control signal ET according to the operational signal PSe and supplies a signal editing circuit 323 in the edition processing unit 32 with the editing control signal ET. When editing of the material data is finished to bring content-data to completion, the editing control unit 33 generates a writing control signal WC according to the operational signal PSe if the
15 operational signal PSe indicates recording operation of the content-data on the data recording apparatus 321. The editing control unit 33 then supplies a write/read processing circuit 322 with the writing control signal WC. The editing control unit 33 also generates an outputting control signal RP according to the operational signal PSe when the operational signal PSe indicates data
20 transmission of the content-data, and supplies the write/read processing circuit 322 with the outputting control signal RP. The editing control unit 33 also generates a speed range setting signal LP according to the operational signal PSe when the operational signal PSe specifies a reproduction speed range of the content-data, supplies the signal editing circuit 323 with the speed range setting
25 signal LP.

[0040]

Based on the reading control signal RC, the write/read processing circuit

322 reads required material data out of the data recording apparatus 321 to supply the signal editing circuit 323 with it. Based on the writing control signal WC, the write/read processing circuit 322 also writes the complete content-data on the data recording apparatus 321. Based on the outputting control signal RP, the
5 write/read processing circuit 322 reads required content-data DC out of the data recording apparatus 321 to output it.

[0041]

The signal editing circuit 323 performs edit processing such as processing, linkage, and deletion of image and audio data based on the editing
10 control signal ET using the image data DV and the audio data DA included in the material data read out of the data recording apparatus 321. In this case, the signal editing circuit 323 supplies the image-outputting signal generation circuit 351 with the image data DVe before, during or after the editing thereof. The signal editing circuit 323 also supplies the audio-outputting signal generation
15 circuit 352 with the audio data DAe before, during or after the editing thereof. When frame rates of the image data DV and the audio data DA are altered according to the edit processing, the signal editing circuit 323 also alters the associated information DM so as to correspond to the edited image data DV and the audio data DA. The signal editing circuit 323 further combines associated
20 information DMc corresponding to the edited image data DV and the edited audio data DA with the edited image data DV and the edited audio data DA to generate the content-data DC. When the signal editing circuit 323 receives the speed range setting signal LP, the signal editing circuit 323 also combines speed range information indicating the reproduction speed range of the content-data DC as the
25 associated information DMc based on the speed range setting signal LP. When the signal editing circuit 323 receives information on a title of the content and a recommended reproduction speed of the content from the user interface unit 34,

the signal editing circuit 323 also combines the information as the associated information DMc. When the signal editing circuit 323 receives information on a reproduction time length of the content-data according to the edit processing, the signal editing circuit 323 combines this information as the associated information
5 DMc. Further, when the signal editing circuit 323 receives information on the maximum reproduction speed available for reproduction of the content-data, the signal editing circuit 323 combines the information on the maximum reproduction speed as the associated information DMc.

[0042]

10 The image-outputting signal generation circuit 351 of an edited outputting signal generation unit 35 generates an image signal Svm based on the image data DVg, DVi supplied from the editing control unit 33 and outputs it to the edited-image-displaying apparatus 40, as described above. This allows information on the material data to be displayed under GUI environment.
15 Further, by generating the image signal Svm based on the image data DVe supplied from the signal editing circuit 323, the image before, during or after the editing thereof can be checked on the screen of the edited-image-displaying apparatus 40.

[0043]

20 The audio-outputting signal generation circuit 352 converts the audio data DAe supplied from the signal editing circuit 323 to an analog audio signal Sam and brings it to a desired signal level to supply the edited-audio-outputting apparatus 41 constituted of a speaker, a head hone, and the like with the converted signal. This allows the audio before, during or after the editing
25 thereof to be checked through an audio output from the editing-audio-transmitting apparatus 41.

[0044]

As described above, when the content-data Dc is complete in the editing apparatus 30 through the post-production process using the material data DTm, the editing apparatus 30 outputs the complete content-data DC.

[0045]

5 Next, a description will be given on operations of the editing apparatus 30. Fig. 7 illustrates a GUI screen displayed on the edited-image-displaying apparatus 40 for an editing operation. In the GUI screen, a material administration browser window 401 for displaying a list of items of the material data as a material administration representation is provided at an upper-left side thereof; a story board window 402 for arranging items of the material data in a reproduction order to produce a content as a reproduction order representation is provided at an lower-left side thereof; a monitor viewer window 403 for displaying an image of the material data before or after the edit processing as a reproduced image representation is provided at an upper-right side thereof; and a
15 time line window 404 for allocating items of the material data along a time axis to produce a content as a reproduction time order representation is provided at a lower-left side thereof. An operation control portion 405 is provided between the monitor viewer window 403 and the time line window 404. It should be noted that locations and sharps of the material administration browser window
20 401, the story board window 402, the monitor viewer window 403, the time line window 404, and the operation control portion 405 are respectively illustrative ones and thus, of course, they are not limited to the above locations and shapes.

[0046]

25 The material administration browser window 401 shows a list of items of the material data stored in the data recording apparatus 321. For each item of the material data, a stamp view (a thumbnail view) for indicating a title, a length, and content of an item of the stored material data, a speed range available for

reproduction at which a natural image may be reproduced without noise, and the like are shown.

[0047]

5 The story board window 402 serves as a working area for production of a content. The story board window 402 arranges items of the material data on a reproduced order to produce a content. The story board window 402 also displays a speed range available for reproduction. The monitor viewer window 403 displays not only an image based on the material data but also a variable speed bar for indicating a speed range available for reproduction and an indication of a reproduction speed within the speed range.

[0048]

15 The time line window 404 serves as a working area for allocating items of the material data along a time axis to perform a more detailed operation for production of content. The time line window 404 also alters a representation width of the material data according to reproduction time calculated based on the reproduction speed. The operation control portion 405 displays operation keys for reproducing the items of material data and the contents arranged on the time line window 404.

[0049]

20 Based on a displayed GUI image and the operational signal PSe received from the user interface unit 34, the editing control unit 33 determines whether or not a drag-and-drop operation, a key-in operation in the operation control portion 405, and the like are carried out. If the editing control unit 33 determines that the drag-and-drop operation and the like have been carried out, the editing control unit 33 controls operations of the editing apparatus 30 according to such

25 [0050]

Fig. 8 is a flowchart showing a display control at the editing operation. At step ST11, the editing apparatus 30 determines whether or not the processing of the material data is requested. If the processing of the material data is not requested, the process goes back to the step ST11. If the processing of the material data is requested, the process goes to step ST12.

[0051]

At step ST12, the editing apparatus 30 determines whether or not frame rate information DM-FRs indicating the set frame rate FRs is obtained from the material data to be edited. Here, the editing apparatus 30 refers to the database information DB, and when it is determined that the frame rate information DM-FRs indicating the set frame rate FRs is not obtained from the material data, the process goes to the step ST13 where the editing apparatus 30 performs display control so that the material data has the same reproduction speed as a normal reproduction speed. When the editing apparatus 30 determines that the frame rate information DM-FRs is obtained from the material data, the process then goes to step ST14.

[0052]

At step ST14, a speed available for reproduction is set based on the set frame rate FRs indicated by the frame rate information DM-FRs. This speed is set so that a noise-less natural reproduction image can be realized through a frame-skipping of a predetermined frame period or a frame repetition. For example, if a multiple of the set frame rate FRs to the reference frame rate FRr is more than one, the speed available for reproduction is set by searching for common divisors of this multiple other than one and calculating reciprocals of the searched common divisors. Specifically, if the set frame rate FRs is 10 times the reference frame rate FRr, the common divisors of this multiple other than one are 2, 4, 5, and 10 and thus, the reciprocals thereof are $1/2$, $1/4$, $1/5$, and $1/10$,

respectively. By selecting one of the reciprocals of the divisors, the speed available for reproduction can be set to less than the same reproduction speed as normal reproduction speed. When the speed available for reproduction not less than the same reproduction speed as the normal reproduction speed is set to positive integer multiples of the normal reproduction speed, the frame-skipping periods in each of the speeds available for reproduction may be equal to each other. An upper limit of the speed available for reproduction is set to a speed at which content of the material data can be grasped easily.

[0053]

If a multiple of the set frame rate FRs to the reference frame rate FRr is less than one, the speed available for reproduction is set by searching for the reciprocals of this multiple and calculating common multiples of the searched reciprocals other than one or integer multiples of the searched reciprocals. If the set frame rate FRs is 1/6 times the reference frame rate FRr, the divisors of the searched reciprocals other than one are of 2, 3, and 6 and the integer multiples of the reciprocals are of 6, 12, 18, ---, respectively. By selecting one of the divisors of the reciprocals and the integer multiples of the reciprocals as the speed available for reproduction, frame-skipping periods or numbers of the frame repetitions in each of the speeds available for reproduction may be equal to each other. Further, in a case where the speed is set to less than the same speed as the normal reproduction speed when the multiple of the set frame rate FRs is smaller than one, the resultant image is a repetition of frame images. Thus, a lower limit of the speed available for reproduction may be set to the same reproduction speed as the normal reproduction speed.

[0054]

At step ST15, the editing apparatus 30 performs display control corresponding to the frame rate information DM-FRs, namely, to display so that

it can be determined that an item of the material data is combined with the frame rate information DM-FRs indicating the set frame rate FRs, as the associated information, and to display the speed range available for reproduction set based on the set frame rate FRs. For example, in the material administration browser window 401 and the story board window 402, in order to easily determine that the item of the material data is combined with the frame rate information DM-FRs, contours, colors, and the like of frames of stamp views 401a, 402a are made different from those of an item the material data that is not combined with the frame rate information DM-FRs. In addition, when an information-representing regions 401b, 402b each for representing information on the material are provided, the speeds available for reproduction set in step ST14 are displayed in each of the regions. For example, in Fig.7 and Figs.9, which will be described later, when the item of the material data is combined with the frame rate information DM-FRs, the frame having its width enlarged is displayed and the speed range available for reproduction is indicated as being “x0.1 through x2.0”.

[0055]

In displaying the time line window 404, similar to the cases of the material administration browser window 401 and the story board window 402, it is possible to easily determine that an item of the material data is combined with the frame rate information DM-FRs indicating the set frame rate FRs, as the associated information. For example, a contour, and a color of a frame of frame image representation region 404a are made different from those of an item of the material data that is not combined with the frame rate information DM-FRs. In the time line window 404, the frame image representation region 404a is adjusted along a horizontal direction, i.e., time axis direction thereof according to the set frame rate FRs. For example, if the set frame rate FRs is greater than the

reference frame rate FRr, a number of frame images per unit of time increases. Accordingly, a representation width of the frame image representation region 404a is enlarged. If the set frame rate FRs is smaller than the reference frame rate FRr, a number of frame images per unit of time decreases. Accordingly, the
5 representation width of the frame image representation region 404a is shortened. Further, the monitor viewer window 403 is provided with a reproduction speed representation 403b and a variable-speed console representation 403c corresponding to the set speed available for reproduction in addition to a material image representation 403a based on the material data to display the reproduction
10 image, the reproduction speed, and the speed available for reproduction. In addition, a cursor position of the variable-speed console representation 404c represented by a bold line allows a control direction to be determined.

[0056]

At step ST16, the editing apparatus 30 determines whether or not the
15 reproduction speed is indicated via the user interface unit 34. When an operation for altering the representation width of the frame image representation region 404a is performed or when the cursor position in the variable-speed console representation 403c represented in the monitor viewer window 403 is moved, the process goes to step ST17. When the reproduction speed is not
20 indicated, the process goes back to step ST16.

[0057]

At step ST17, the editing apparatus 30 determines the indicated reproduction speed to display the reproduction speed thus determined. For example, when an operation for altering the representation width of the frame
25 image representation region 404a in the time line window 404 is performed, a reproduction speed is selected in sequence from the speeds available for reproduction set at step ST14 depending on the operational direction to set a

speed when completing the operation as the reproduction speed. When the cursor position in the variable-speed console representation 403c represented in the monitor viewer window 403 is moved, a reproduction speed is selected from the speeds available for reproduction set at step ST14 depending on the cursor position to set the selected speed as the reproduction speed.

[0058]

When the reproduction speed is determined, the indicated reproduction speed is shown in the reproduction speed representation 403b of the monitor viewer window 403. Further, the cursor position of the variable-speed console representation 403c and the representation width of the frame image representation region 404a are being in cooperation with each other. Thus, when the reproduction speed is indicated by an operation of altering the representation width of the frame image representation region 404a, the cursor position of the variable-speed console representation 403c is moved to a position corresponding to the indicated reproduction speed to display the reproduction speed. When the reproduction speed is indicated by an operation of altering the cursor position in the variable-speed console representation 403c, the representation width of the frame image representation region 404a is altered to a width corresponding to the indicated reproduction speed. As described above, since the cursor position in the variable-speed console representation 403c and the representation width of the frame image representation region 404a are being in cooperation with each other, the reproduction speed can be correctly altered using either of these two methods.

[0059]

At step ST18, based on the indicated reproduction speed, the editing apparatus 30 calculates reproduction time when reproducing the material data at the indicated reproduction speed. For example, when the set frame rate FRs is

10 times the reference frame rate FRr, a slow speed available for reproduction is of any one of "1/10, 1/5, 1/4 and 1/2" of the normal reproduction speed. For example, if the reproduction time of the material is 30 seconds when the reproduction speed is the same speed as normal reproduction speed, the reproduction time when the reproduction speed is 1/10 times the normal reproduction speed is 300 seconds. The reproduction time when the reproduction speed is 1/5 times the normal reproduction speed is 150 seconds. As described above, by multiplying the reproduction time when the reproduction speed is the same speed as normal reproduction speed by the reciprocal of the multiple of the reproduction speed at the reproduction, the reproduction time can be calculated.

[0060]

At step ST19, the editing apparatus 30 performs a display control according to the reproduction time. For example, the representation width of the frame image representation region 404a in the time line window 404 is altered according to the reproduction time calculated at step ST18, and the process goes back to step ST16. During reproduction operation of the material data, the reproduced image when reproducing the material data at the indicated reproduction speed is displayed as the material image representation 403a of the monitor viewer window 403.

[0061]

If the reproduction time on a scene of a part of the material data is altered, the scene is split and then, the above process is conducted on the split scenes, thereby allowing alteration of the reproduction time.

[0062]

Figs.9 show an editing operation screen in the case of using the material data combined with the frame rate information DM-FRs indicating that, for

example, the set frame rate FRs is 10 times the reference frame rate FRr. Fig. 9A illustrates the GUI screen where the reproduction speed is the same speed as the normal reproduction speed. Fig. 9B illustrates the GUI screen where the reproduction speed is one-tenth times the normal reproduction speed. Fig. 9C illustrates the GUI screen where the reproduction speed is twice as much as the normal reproduction speed. For example, in a case of an item of the material data that is combined with the information on the set frame rate FRs, a frame out of the item of the material data is displayed in the story board window 402 and the time line window 404 in a manner different from a case of an item of the material data that is not combined with the frame rate information DM-FRs indicating the set frame rate FRs.

[0063]

When reproducing the selected material data, the set frame rate FRs is determined on the basis of the frame rate information DM-FRs, and then, a reproduction speed FP is multiplied by the set frame rate FRs to calculate a determined value FD, and reproduction conditions are determined based on the determined value FD. For example, when the reproduction speed is the same speed as the normal reproduction speed as shown in Fig. 9A and the set frame rate FRs is 10 times the reference frame rate FRr, the determined value FD is $(1 \times 10 = 10)$. It should be noted that Fig. 10A illustrates images based on the image data DV in a case where the set frame rate FRs is 10 times the reference frame rate FRr. Fig. 10B illustrates the frame rate information DM-FRs indicating the set frame rate FRs of each of the frame images. Fig. 10C illustrates the absolute frame numbers AN.

[0064]

When the determined value FD is set to 10, namely, $FD = 10$, as shown in Figs. 10D and 10E, the image signal Svm is generated using every 10 frames,

namely, with the image data of nine frames being skipped to display reproduced images having the same speed as the normal reproduction speed on the monitor viewer window 403 based on the image signal Svm. It should be noted that Fig. 10D illustrates the absolute frame numbers AN of the displayed frame images, and Fig. 10E illustrates frame images displayed on the material image representation 403a of the monitor viewer window 403 by the image signal Svm.

[0065]

Next, when an operation of enlarging the representation width of the frame image representation region 404a in the time line window 404 along a direction indicated by an arrow A or moving the cursor position in the variable-speed console representation 403c in a direction indicated by an arrow B is carried out, processing as the slow motion of reproduction is performed. For example, when the reproduction speed is set to 1/10 times the normal reproduction speed, the reproduction speed representation 403b in the monitor viewer window 403 is altered to "x 0.1" as shown in Fig. 9B. At the same time, the cursor position in the variable-speed console representation 403c is moved to a cursor position corresponding to a speed of one-tenth times the normal reproduction speed. Further, since the reproduction time becomes longer, the representation width of the frame image representation region 404a is enlarged.

[0066]

If the reproduction speed is set to 1/10 times the normal reproduction speed as shown in the displayed screen of Fig. 9B, the determined value FD is set to one, namely, $FD=10*(1/10)=1$. When the determined value FD is set to one, namely, $FD=1$, the image signal Svm is generated using every $FD=1$ frame of the image data DV, namely, without any frame being skipped. This allows the reproduced images having a speed of one-tenth times the normal reproduction speed to be displayed on the material image representation 403a of the monitor

viewer window 403 as shown in Fig. 10A.

[0067]

When an operation of shortening the representation width of the frame
image representation region 404a in the time line window 404 along the direction
5 indicated by the arrow B or moving the cursor position in the variable-speed
console representation 403c in the direction indicated by an arrow A is carried out,
a processing as the quick motion of reproduction is performed. For example,
when the reproduction speed is set to twice as much as the normal reproduction
speed, the reproduction speed representation 403b in the monitor viewer window
10 403 is altered to "x 2.0" as shown in Fig. 9C. In addition, the cursor position in
the variable-speed console representation 403c is moved to a cursor position
corresponding to twice of the normal reproduction speed. Further, since the
reproduction time becomes shorter, the representation width of the frame image
representation region 404a is shortened, as shown in Fig. 9C.

15 [0068]

If the reproduction speed is set to twice of the normal reproduction speed
as shown in the displayed screen of Fig. 9C, the determined value FD is set to 20,
namely, $FD=10*2=20$. When the determined value FD is set to 20, namely,
FD=20, the image signal Svm is generated using every 20 frames, namely, with
20 the image data of nineteen frames being skipped. This allows the reproduced
images having a twice speed as much as the normal reproduction speed to be
represented on the monitor viewer window 403 based on the image signal Svm,
as shown in Figs. 10F and 10G. It should be noted that Fig. 10F illustrates the
absolute frame numbers AN of the displayed frame images, and Fig. 10G
25 illustrates frame images displayed in the material image representation 403a of
the monitor viewer window 403.

[0069]

Thus, the noise-less slow reproduction may be easily realized by carrying out frame-skipping on a frame basis based on the frame rate information DM-FRs and the reproduction speed. It should be noted that by enabling an operation of altering the reproduction speed during the reproduction, the reproduced image can be checked at a desired reproduction speed at easy.

[0070]

Since the reproduction speed and the representation width are displayed with them being linked with each other, a relationship between the reproduction speed and expansion/contraction of the time axis may be easily grasped, thereby allowing the editing operation to be easily conducted. It should be noted that, when the frame image representation region 404a is provided with an indication for indicating a direction in which the representation width of the frame image representation region 404a can be altered, namely, a direction in which the reproduction speed can be altered, for example, an arrow indication illustrated by a dotted line, it is possible to find out the direction in which the reproduction speed can be altered, at easy.

[0071]

Fig. 11 is a flowchart showing an edit processing operation in which display control as shown in Fig. 8 is performed and the GUI screen as shown in Figs. 9 is used, for example. At step ST21 the material data is captured and recorded on the data recording apparatus 321 to generate the database information DB.

[0072]

At step ST22, content of the captured material data is displayed using the database information DB. Displaying the content of the captured material data is carried out by causing the material administration browser window 401 to display a stamp view and information of the captured material data. When any

material data displayed on the material administration browser window 401 is selected, the monitor viewer window 403 displays image of the selected material data. Further, when a reproduction control key representation in the operation control portion 405 provided between the monitor viewer window 403 and the time line window 404 is operated, reproduction, stop, and reproduction at various speeds or the like of the material data is carried out according to the key operation, and then the reproduced image is displayed in the monitor viewer window 403.

[0073]

At step ST23, whether or not selection of material data is made is determined. If the selection of material data is not made, the process goes back to step ST23. If the selection of material data is made, the process goes to step ST24. For example, when a drag-and-drop operation from the material administration browser window 401 to the time line window 404 is made, it is determined that the selection of material data is made, and the process goes to step ST24.

[0074]

At step ST24, the editing apparatus 30 arranges frame images generated based on the selected material data in an imaged time order and displays them on the frame image representation region 404a of the time line window 404.

[0075]

At step ST25, the material data is processed according to various editing operations such as cut and paste or replacement of the frame images displayed on the time line window 404. The editing apparatus 30 then generates a desired image and audio data to produce content-data. In addition, the associated information DMc indicating the set frame rate and the like is combined to the image and audio data to create the content-data.

[0076]

At step ST26, a completion process of the content-data is performed, in which the content-data created at step ST25 is subjected to processes such as a process on bridges of the material data, addition enhancement of effects, and
5 synthesis of images and audio to be added. At step ST27, an outputting process of the content-data is performed. That is, the complete content-data is output as program data for broadcasting to a program-sending apparatus. Alternatively, the complete content-data is output as content-data for distribution to a contents-sending apparatus. Further, an authoring process such as addition of
10 information for carrying out special reproduction corresponding to a menu list for reproducing the content or a reproduction menu and the like to the complete content-data. Then, the data subjected to the authoring process is recorded on the recording medium.

[0077]

15 Incidentally, the above edit processing by the editing apparatus 30 may also be realized through a software process using a computer. Fig. 12 shows a configuration in a case where the edit processing is carried out using the software.

[0078]

20 The computer includes a CPU (Central Processing Unit) 381 therein as shown in Fig. 12. A ROM 382, a RAM 383, a data storage unit 384 constituted of a hard disk drive with a large storage capacity and the like, and an input/output interface 385 are connected with the CPU 381 via a bus 390. A signal-inputting unit 391, a signal-outputting unit 392, and a recording medium drive 393 are
25 connected with the input/output interface 385.

[0079]

The CPU 381 executes programs stored on the ROM 382, the RAM 383

or the data storage unit 384 to perform the edit processing as shown in Fig. 8 and Fig. 11. Material data input to the signal-inputting unit 391 is stored on the data storage unit 384 via the input/output interface 385 and the bus 390. In addition, an item of the material data to be used for editing is read from the material data stored on the data storage unit 384, and the edit processing is performed on the item of the material data, and the complete content-data is stored on the data storage unit 384 again. The complete content-data stored on the data storage unit 384 is read out and output through the signal-outputting unit 392.

[0080]

It is conceivable that a program for performing the edit processing may be previously stored on the ROM 382 or the data storage unit 384. Alternatively, a program for performing contents-sending process stored on the recording medium or a program stored on the recording medium may be read out and executed. A program may be output through wired or wireless transmission line. The received program may be executed in the computer.

[0081]

Thus, according to the embodiment as described above, the items of the material data which are combined with the frame rate information as the associated information and the items which are not combined with the frame rate information is displayed in a manner that allows them to be distinguished from each other. Accordingly, a scene available for reproducing a slow motion image by using the frame rate information of the material data can be easily found out. Further, since a speed range available for reproduction is displayed on the basis of the associated information, a variable speed reproduction can be realized by setting a speed within the speed range. Accordingly, effective image expression can be easily enhanced.

[0082]

The editing apparatus 30 may also provide the contents having a wide speed range available for reproduction using the material data effectively if it may generate the content-data without any frame rate of the material data being reduced.

5 [0083]

[EFFECT OF THE INVENTION]

According to the invention, material data is captured and an edit processing is performed using captured material data. In the edit processing, an image based on the captured material data or a material data being subjected to the edit processing is displayed. The material data is displayed in the edited image in a manner that allows items of the material data that are combined with frame rate information as associated information and items of the material data which are not combined with the the frame rate information to be distinguished from each other. Accordingly, a scene available for reproducing a slow motion image by using the frame rate information of the material data can be easily found out.

15 [0084]

Further, a speed range available for reproduction of the material data is set based on the associated information, and the determined speed range available for reproduction is displayed. Accordingly, the reproduction speed at which reproduction can be performed without noise can be easily set. In addition, in a reproduction time order representation for allocating items of the material data along a time axis to produce a content, a representation width of the material data is altered according to reproduction time calculated on the basis of the reproduction speed in said reproduction time order representation. Accordingly, expansion/contraction of the time axis can be grasped visually. Further, when an operation of altering the representation width of the material data in the

reproduction time order representation is performed, an indication of the reproduction speed is altered according to the operation. When an operation of altering the indication is performed, the representation width of the material data in the reproduction time order representation is altered according to the operation.

5 Thus, the relation between the reproduction speed and the expansion/contraction of the time axis can be grasped easily.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[FIGURE 1] A diagram for illustrating a whole configuration of a content-editing system;

10 [FIGURE 2] A block diagram showing a configuration of an imaging apparatus;

[FIGURE 3] A block diagram showing another configuration of the imaging apparatus;

[FIGURE 4] Diagrams showing relationship (part 1) between image data and associated information;

15 [FIGURE 5] Diagrams showing relationship (part 2) between the image data and the associated information;

[FIGURE 6] A block diagram showing a configuration of an editing apparatus;

[FIGURE 7] An illustration of GUI screen at an editing operation;

20 [FIGURE 8] A flowchart showing a display control at the editing operation;

[FIGURE 9] Illustrations each for GUI screen at the editing operation;

[FIGURE 10] Illustrations showing a reproduction operation of the image;

25 [FIGURE 11] A flowchart showing an edit processing operation; and

[FIGURE 12] An illustration showing a configuration of a content-editing system for editing content by means of software.

[DESCRIPTION OF REFERENCE NUMERALS]

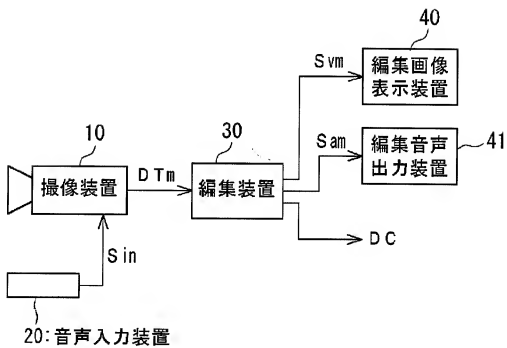
	10, 10a	Imaging apparatus
	12	Imaging unit
	13,17	Signal processor
5	14,18	Controller
	15	Outputting unit
	16, 34	User interface unit
	20	Audio input apparatus
	30	Editing apparatus
10	31	Material capture unit
	32	Edition processing unit
	33	Editing control unit
	35	Edited outputting signal generation unit
	40	Edited-image-displaying apparatus
15	41	Edited-audio-outputting apparatus
	131	Camera processing circuit
	132	Audio processing circuit
	141, 181	Imaging control circuit
	142, 182	Timing generator
20	171	Effective data selection circuit
	183	Effective frame signal generation circuit
	311	Information detection circuit
	312	Database-processing circuit
	321	Data recording apparatus
25	322	Write/read processing circuit
	323	Signal editing circuit
	351	Image-outputting signal generation circuit

	352	Audio-outputting signal generation circuit
	384	Data storage unit
	391	Signal-inputting unit
	392	Signal-outputting unit
5	401	Material administration browser window
	402	Story board window
	403	Monitor viewer window
	404	Time line window
	405	Operation control portion
10		

【書類名】 図面

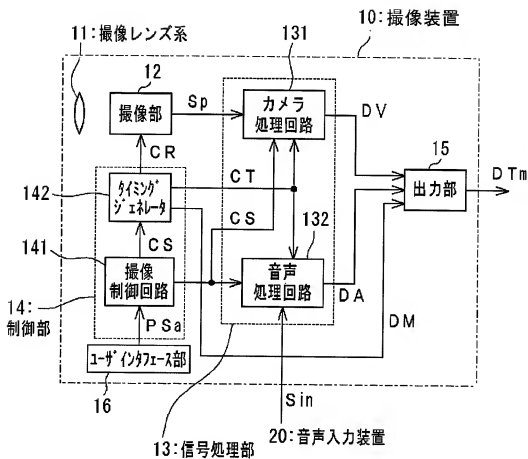
【図 1】

コンテンツ編集システム



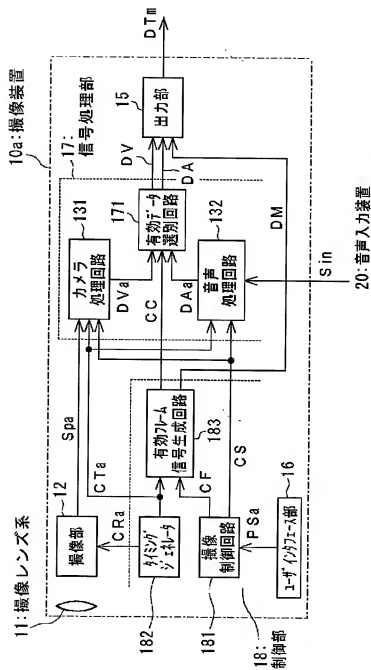
【図 2】

撮像装置の構成



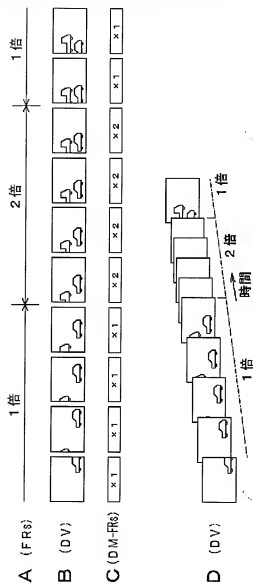
【図3】

撮像装置の他の構成



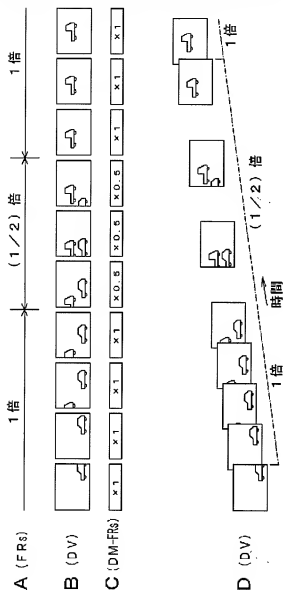
【図 4】

映像データと付属情報の関係（その 1）



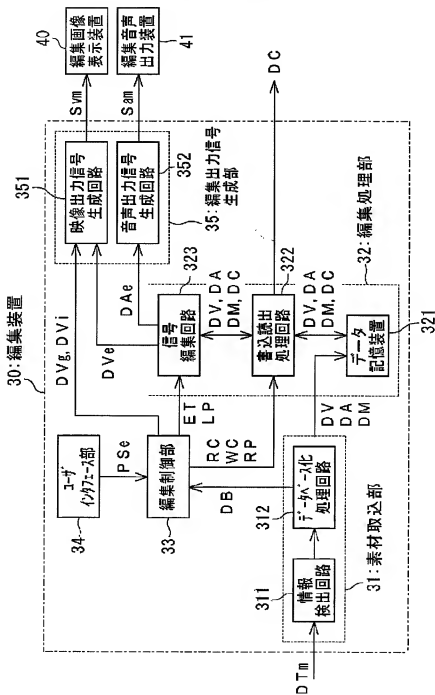
【図5】

映像データと付属情報の関係（その2）



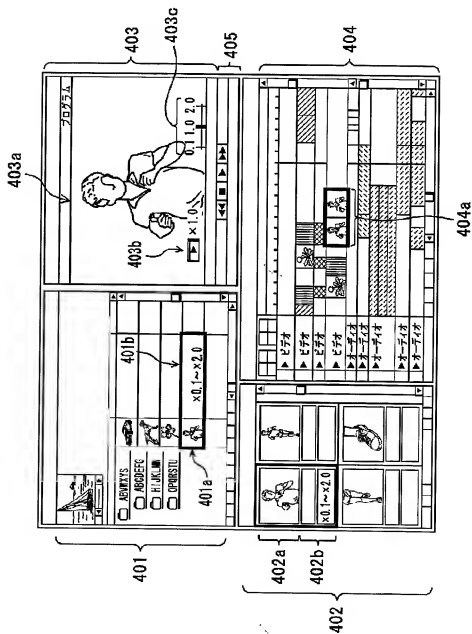
【図6】

編集装置の構成



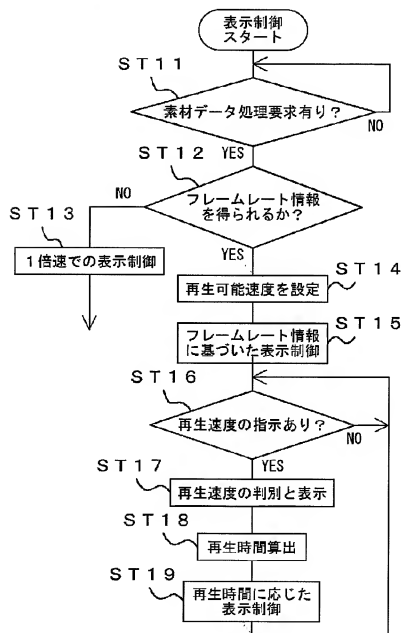
【図 7】

編集操作のためのGUI画面



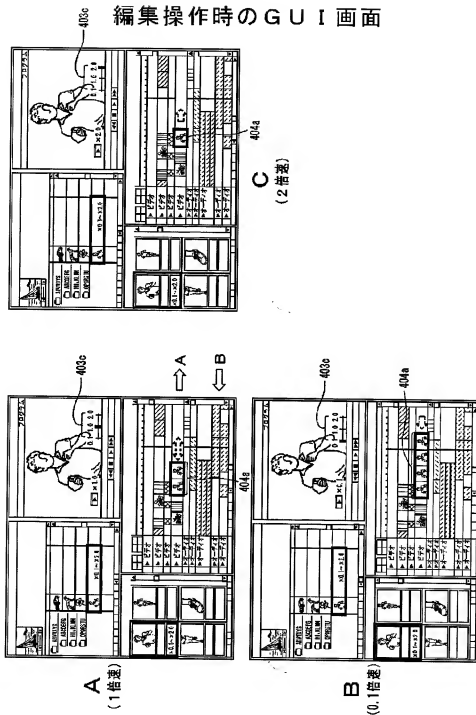
【図8】

編集動作時の表示制御



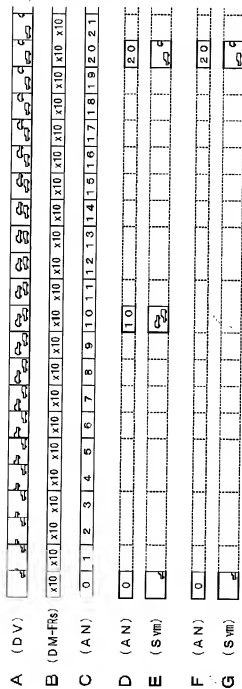
【図9】

編集操作時のGUI画面



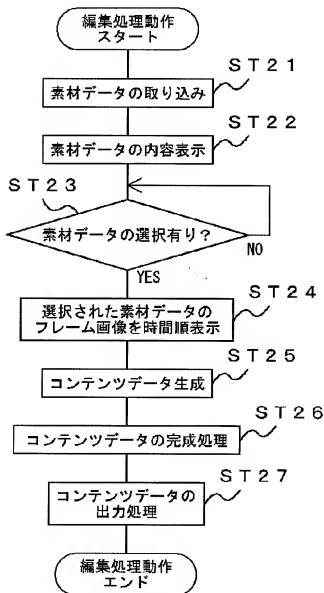
【図 10】

画像再生動作



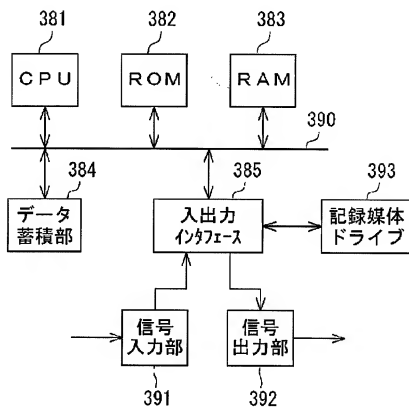
【図 11】

編集処理動作



【図 1 2】

ソフトウェアで編集処理を行う場合の構成



	【書類名】 図面	[NAME OF DOCUMENT] DRAWINGS
	【図 1】	FIGURE 1
	1 0	Imaging apparatus
	2 0	Audio input apparatus
5	3 0	Editing apparatus
	4 0	Edited-image-displaying apparatus
	4 1	Editing-audio-outputting apparatus
	コンテンツ編集システム	Content-editing system
10	【図 2】	FIGURE 2
	1 0	Imaging apparatus
	1 1	Imaging lens system
	1 2	Imaging unit
	1 3	Signal processor
15	1 4	Controller
	1 5	Outputting unit
	1 6	User interface unit
	2 0	Audio input apparatus
	1 3 1	Camera processing circuit
20	1 3 2	Audio processing circuit
	1 4 1	Imaging control circuit
	1 4 2	Timing generator

撮像装置の構成

Configuration of imaging apparatus

【図 3】

FIGURE 3

1 0 a

Imaging apparatus

5

1 1

Imaging lens system

1 2

Imaging unit

1 5

Outputting unit

1 6

User interface unit

1 7

Signal processor

10

1 8

Controller

2 0

Audio input apparatus

1 3 1

Camera processing circuit

1 3 2

Audio processing circuit

1 7 1

Effective data selection circuit

15

1 8 1

Imaging control circuit

1 8 2

Timing generator

1 8 3

Effective frame signal generation circuit

撮像装置の他の構成

Another configuration of imaging apparatus

20

【図 4】

FIGURE 4

映像データと付属情報の関係 (その 1) Relationship (part 1) between image data and associated information

1 倍

Normal speed

2 倍	Twice speed
時間	Time

【図 5】 FIGURE 5

5 映像データと付属情報の関係（その 2） Relationship (part 2) between the
image data and the associated information

1 倍	Normal speed
1 / 2 倍	Half speed
時間	Time

10

【図 6】 FIGURE 6

3 0	Editing apparatus
3 1	Material capture unit
3 2	Edition processing unit
15 3 3	Editing control unit
3 4	User interface unit
3 5	Edited outputting signal generation unit
4 0	Edited-image-displaying apparatus
4 1	Editing-audio-outputting apparatus
20 3 1 1	Information detection circuit
3 1 2	Database-processing circuit
3 2 1	Data recording apparatus
3 2 2	Write/read processing circuit

3 2 3	Signal editing circuit
3 5 1	Image-outputting signal generation circuit
3 5 2	Audio-outputting signal generation circuit
編集装置の構成	Configuration of editing apparatus

5

【図 7】

FIGURE 7

編集操作のための G U I 画面
editing operation

Illustration for GUI screen at an

ビデオ

Video

10

オーディオ

Audio

プログラム

Program

【図 8】

FIGURE 8

S T 1 1

Is processing of material data requested?

15

S T 1 2

Is frame rate information obtained?

S T 1 3

Perform display control so that material data

has normal reproduction speed

S T 1 4

Set speed available for reproduction

S T 1 5

Perform display control based on frame rate

20

information

S T 1 6

Is reproduction speed is indicated?

S T 1 7

Display determination of reproduction speed

S T 1 8

Calculate reproduction time

	S T 1 9	Perform display control according to the reproduction time
	編集動作時の表示制御	Display control at the editing operation
	表示制御スタート	Start display control
5	【図 9】	FIGURE 9
	編集操作時の G U I 画面	GUI screen at editing operation
	1 倍速	Normal speed
	0. 1 倍速	1/10 times normal speed
10	2 倍速	Twice speed
	ビデオ	Video
	オーディオ	Audio
	プログラム	Program
15	【図 1 0】	FIGURE10
	画像再生動作	Reproduction operation of image
	【図 1 1】	FIGURE 11
	S T 2 1	Capture material data
20	S T 2 2	Display content of material data
	S T 2 3	Is material data selected?
	S T 2 4	Arrange frame images of selected material data in time order

	S T 2 5	Produce content-data
	S T 2 6	Perform completion process on content-data
	S T 2 7	Perform outputting process on content-data
	編集処理動作	Edit processing operation
5	編集処理動作スタート	Start edit processing operation
	編集処理動作エンド	End of edit processing operation
	【図 1 2】	FIGURE 12
	3 8 4	Data storage unit
10	3 8 5	Input/output interface
	3 9 1	Signal inputting unit
	3 9 2	Signal-outputting unit
	3 9 3	Recording medium drive
15	ソフトウェアで編集処理を行う場合の構成	Configuration in a case where edit processing is performed by using software

[NAME OF DOCUMENT] ABSTRACT

[SUMMARY]

[OBJECT] To easily perform edit processing using material generated at a standard frame rate and material generated at an altered frame rate.

5 [SOLVING MEANS] When an image based on captured material data or material data being subjected to edit processing is displayed on a material administration browser 401, a story board window 402 and a time line window 404, items of the material data which are combined with frame rate information as associated information and items of the material data which are not combined with the frame rate information are displayed in a manner that allows them to be distinguished from each other. When displaying the items of the material data which are combined with the frame rate information as the associated information, a speed range available for reproduction that is set based on based the frame rate information of the material data is displayed. A monitor viewer window 403
10 includes a reproduction speed representation 403b and a variable-speed console representation 403c for altering a reproduction speed within the speed range available for reproduction. Reproduction images are displayed on a material image representation 403a at the set reproduction speed.

[SELECTED DRAWING] Figure 7

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- ☐ その他

以 上

Application No.2002-332650

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[NAME OF DOCUMENT] SPECIFICATION

[TITLE OF THE INVENTION] APPARATUS FOR CONTROLLING CONTENTS, METHOD
AND PROGRAM FOR CONTROLLING EDITING IMAGE DISPLAY OF CONTENTS

5 [NAME OF DOCUMENT] SCOPE OF CLAIMS

[CLAIM 1] An apparatus for controlling an editing image display comprising:
a material capture means for capturing material data;

a edit processing means for recording the material data captured by said material
capture means and editing the recorded material data;

10 a edit-transmitting signal generation means for generating a transmitting signal
based on the material data by said edit processing means or the material data on the
editing process and transmitting;

a user interface unit for generating operation signal corresponding to operations;
and

15 a editing control means for controlling working of said material capture means,
said edit processing means, and said edit-transmitting signal generation means based on
the operation signal,

wherein said editing control means controls said edit-transmitting signal
generation means, and transmits a transmitting signal to display items of said material data
20 that is combined with the frame rate information as the associated information and not
combined with the frame rate information as the associated information with said items of
the material data being distinguished from each other.

[CLAIM 2] The apparatus according to Claim 1, wherein said editing control
means provides a material administration representation for displaying a list of items of
25 the material data, and displays said items of the material data that is combined with the
associated information and not combined with the associated information with said items
of the material data being distinguished from each other in the material administration
representation.

[CLAIM 3] The apparatus according to Claim 1, wherein said editing control means provides a reproduction order representation to arrange in a reproduction order to create the contents, and displays said items of the material data that is combined with the as the associated information and not combined with the the associated information with said items of the material data being distinguished from each other in the reproduction order representation.

[CLAIM 4] The apparatus according to Claim 1, wherein said editing control means provides a reproduction time order representation to allocate said the material data along a time axis to create the contents, and displays said items of the material data that is combined with the as the associated information and not combined with the the associated information with said items of the material data being distinguished from each other in the reproduction order representation.

[CLAIM 5] The apparatus according to Claim 1, wherein said editing control means sets a speed range available for reproduction on said material data based on said associated information, and controls said edit-transmitting signal generation means to transmit the transmitting signal for displaying speed range available for reproduction.

[CLAIM 6] The apparatus according to Claim 5, wherein said editing control means provides a material administration representation for displaying a list of items of the material data and said speed range available for reproduction is displayed in said material administration representation.

[CLAIM 7] The apparatus according to Claim 5, wherein said editing control means provides a reproduction order representation to arrange in a reproduction order to create the contents, and displays said determined speed range available for reproduction in the reproduction order representation.

[CLAIM 8] The apparatus according to Claim 5, wherein said editing control means provides a reproduction image representation of said material, and displays said determined speed range available for reproduction in the reproduction image representation.

[CLAIM 9] The apparatus according to Claim 8, wherein said control means provides a indication for indicating the reproduction speed and the display of said speed range available for reproduction includes said indication.

5 [CLAIM 10] The apparatus according to Claim 5, wherein said editing control means provides a reproduction time order representation allocating said items of the material data along a time axis to create a content, and displays a representation width of said material data being altered according to reproduction time calculated on the basis of the reproduced speed.

10 [CLAIM 11] The apparatus according to Claim 5, wherein said editing control means provides a reproduction image representation of said material data and a reproduction time order representation to allocate the material data along a time axis to create the contents, provides a indication for indicating the reproduction speed, the display of said speed range available for reproduction includes said indication, and displays a representation width of said material data being altered according to
15 reproduction time calculated on the basis of the reproduced speed;
wherein when said representation width of said material data in said reproduction time order representation is varied, said indication is altered according to the operation; and when said indication is varied, said representation width of said material is altered according to the operation.

20 [CLAIM 12] The apparatus according to Claim 5, wherein, when said material data is set to be reproduced at a reproduction speed within said speed range available for reproduction, said editing control means controls said edit-transmitting signal generation means to transmit edit-transmitting signal based on the material data reproduced at said set reproduction speed to reproduce the material data at said set reproduction speed.

25 [CLAIM 13] A method for controlling an editing image display comprising the steps of:

capturing material data; and

editing the material data captured and displaying image based on the material

data on the deting process;

wherein, in said editted image items of said material data that is combined with the frame rate information as the associated information and not combined with the frame rate information as the associated information with said items of the material data being distinguished from each other.

5 [CLAIM 14] The method according to Claim 13, wherein, a material administration representation for displaying a list of items of the material data is provided, and said items of the material data that is combined with the associated information and not combined with the associated information with said items of the material data being distinguished from each other in the material administration is displayed in said material administration representation.

10 [CLAIM 15] The method according to Claim 13, wherein, a reproduction order representation to arrange in a reproduction order to create the contents is provided, and said items of the material data that is combined with the as the associated information and not combined with the the associated information with said items of the material data being distinguished from each other in the reproduction order display is displayed in said reproduction order representation .

15 [CLAIM 16] The method according to Claim 13, wherein, a reproduction time order representation to allocate the material data along a time axis to create the contents is provided, and said items of the material data that is combined with the associated information and not combined with the the associated information with said items of the material data being distinguished from each other in the reproduction order display is displayed in said reproduction time order representation.

20 [CLAIM 17] The method according to Claim 13, wherein, a speed range available for reproduction is set on said material data based on said associated information, and said determined display speed range available for reproduction is displayed.

25 [CLAIM 18] The method according to Claim 17, wherein, a material administration representation for displaying a list of items of the material data, and said

determined speed range available for reproduction is displayed in said material administration representation.

5 [CLAIM 19] The method according to Claim 17, wherein, a reproduction order representation to arrange in a reproduction order to create the contents is provided, and said determined speed range available for reproduction is displayed in said reproduction order representation.

[CLAIM 20] The method according to Claim 17, wherein, a reproduction image representation of said material is provided, and said determined speed range available for reproduction is displayed in said reproduction image representation.

10 [CLAIM 21] The method according to Claim 20, wherein the display of said speed range available for reproduction includes an indication for indicating the reproduction speed.

15 [CLAIM 22] The method according to Claim 17, wherein, a reproduction time order representation to allocate the material data along a time axis to create the contents is provided and a representation width of said material data being altered according to reproduction time calculated on the basis of the reproduced speed in said reproduction time order representation.

20 [CLAIM 23] The method according to Claim 17, wherein a reproduction image representation of said material data and a reproduction time order representation to allocate the material data along a time axis to create the contents are provided, a indication for indicating the reproduction speed is provided, the display of said speed range available for reproduction includes said indication, and a representation width of said material data being altered according to reproduction time calculated on the basis of the reproduced speed is displayed;

25 wherein, when said representation width of said material data in said reproduction time order representation is varied, said indication is altered according to the operation, and when said indication is varied, said representation width of said material is altered according to the operation.

[CLAIM 24] The method according to Claim 17, wherein, when a reproduction operation is set to reproduce said material data at a reproduction speed within said speed range available for reproduction of said material data, signal based on the material data reproduced at said set reproduction speed is transmitted to reproduce the material data at said set reproduction speed.

[CLAIM 25] A program for allowing a computer to carry out a method for controlling an editing image display, said method comprising the steps of:
setting display speed available for reproduction based on frame information when the frame information can be gotten on editing material data;
controlling display according to said frame information;
displaying indicated reproduction speed when the reproduction speed is indicated;
calculating reproduction time reproduced said material data at indicated reproduction speed on indicated reproduction speed;
controlling display according to said reproduction time;
displaying reproduction image of said material data at said indicated reproduction speed.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[TECHNICAL FIELD TO WHICH THE INVENTION BELONGS]

The invention relates to an apparatus for controlling contents and a method and program for controlling an editing image display of contents. Particularly the editing process is performed using determined material data. In the editing process a image is displayed on based the determined material data or a material data on the editing process. In the edited image the items of determined material data that is combined with the frame rate information as the associated information and not combined with the frame rate information as the associated information, respectively, is displayed with the items of the determined material data being distinguished from each other.

[0002]

[PRIOR ART]

5 In generation of contents on audio and/or video for broadcasting, a distribution via a communication network or circulation by recording medium, and the like, the contents altering motion speed of a subject partially for only a set period has been used in addition to the contents generated at a reference frame rate in order to obtain enhanced effects the creator wishes to create.

[0003]

10 In such the generation of contents altering the motion speed of the subject, a higher frame rate relevant to a reference frame rate is illustratively set to generate the contents. Alternatively, a lower frame rate relevant to a reference frame rate is set to generate the contents, and then the contents are reproduced at the reference frame rate so that quick motion contents can be produced. Further, adapting the frame rate to be set and the frame rate at the reproduction allows the motion speed of the subject to be freely altered.

15 [0004]

Thus, the creator performs an editing process to create the contents using not only the contents generated at the reference frame rate but also the contents of altered motion speed of the subject, in order to obtain the enhanced effects the creator wishes to create.

[0005]

20 It has been proposed in Japanese Patent Publication No. Tokkaihei11-177903 that the video camera allows time axis to be compressed or extended in order to generate the contents altering the frame rate.

[0006]

[Patent Document]

25 Japanese Patent Application Laid-open No. HEI 11-177930

[0007]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

When the creator performs the editing process using not only the contents

generated at the reference frame rate but also the contents of altered motion speed of the subject as material, it is not easily determined which of frame rates each of the contents has been generated if merely the images of contents are displayed. Further, when it performs the speed change on the contents of altered motion speed of the subject, it is impossible to determine whether or not the speed change can be performed without any deterioration in image quality of the displayed image. If a frame rate is set (hereinafter, referred to as, "set frame rate") to 10 times the reference frame rate, the reproduced contents are displayed one-tenth in a motion of subject if the contents generated at the set frame rate are reproduced at the reference frame rate. Here, it is conceivable that since the set frame rate is 10 times the reference frame rate when the creator wants to display the contents one-fifth in a motion of subject, the speed change can be easily performed without any deterioration in image quality of the displayed image if performing a frame-skipping for each frame. It, however, is impossible to determine whether or not the speed change can be easily performed without any deterioration in image quality of the displayed image, based on merely the displayed image.

【0008】

It is an object of the present invention to present a method and an apparatus for controlling an editing image display wherein the editing process is easily allowed using material generated at the reference frame rate but also material altering the frame rate.

【0009】

【MEANS FOR SOLVING THE PROBLEMS】

According to the present invention, an apparatus for controlling an editing image display comprising:

a material capture means for capturing material data;

a edit processing means for recording the material data captured by said material capture means and editing the recorded material data;

a edit-transmitting signal generation means for generating a transmitting signal based on the material data by said edit processing means or the material data on the

editing process and transmitting;

a user interface unit for generating operation signal corresponding to operations;
and

5 a editing control means for controlling working of said material capture means,
said edit processing means, and said edit-transmitting signal generation means based on
the operation signal,

wherein said editing control means controls said edit-transmitting signal
generation means, and transmits a transmitting signal to display items of said material data
that is combined with the frame rate information as the associated information and not
10 combined with the frame rate information as the associated information with said items of
the material data being distinguished from each other.

【00010】

A method for controlling an editing image display comprising the steps of:
capturing material data; and

15 editing the material data captured and displaying image based on the material
data on the editing process;

wherein, in said edited image items of said material data that is combined with
the frame rate information as the associated information and not combined with the frame
rate information as the associated information with said items of the material data being
20 distinguished from each other.

【00011】

A program for allowing a computer to carry out a method for controlling an
editing image display, said method comprising the steps of:

25 setting display speed available for reproduction based on frame information when
the frame information can be gotten on editing material data;
controlling display according to said frame information;
displaying indicated reproduction speed when the reproduction speed is indicated;
calculating reproduction time reproduced said material data at indicated

reproduction speed on indicated reproduction speed;
controlling display according to said reproduction time;
displaying reproduction image of said material data at said indicated reproduction speed.

5

【0012】

In this invention, material data is captured, the editing process is performed using the determined material data. In the editing process a image is displayed on based the determined material data or a material data on the editing process. In the edited image, the items of determined material data that is combined with the frame rate information as the associated information and not combined with the frame rate information as the associated information, respectively, is displayed with the items of the determined material data being distinguished from each other. In the edited image, the material control display that shows a list of the material data is set up. In the material control display the items of determined material data that is combined with the frame rate information as the associated information and not combined with the frame rate information as the associated information is displayed with the items of the determined material data being distinguished from each other. And a reproduction order representation to arrange in a reproduction order to create the contents is provided, and the items of the material data that is combined with the as the associated information and not combined with the the associated information with the items of the material data being distinguished from each other in the reproduction order display is displayed in the reproduction order representation. Further a reproduction time order representation to allocate the material data along a time axis to create the contents is provided, and the items of the material data that is combined with the associated information and not combined with the the associated information with the items of the material data being distinguished from each other in the reproduction order display is displayed in the reproduction time order representation. Further a speed range available for reproduction is set on the material data based on the associated information, and the determined display speed range available for reproduction

10

15

20

25

is displayed. This speed range available for reproduction is displayed in the material administration representation for displaying a list of items of the material data, the reproduction order representation to arrange in a reproduction order to create the contents, and the reproduction image representation of the material data. The display of the speed range available for reproduction includes an indication for indicating the reproduction speed. The reproduction time order representation to allocate the material data along a time axis to create the contents is provided and a representation width of said material data being altered according to reproduction time calculated on the basis of the reproduced speed in the reproduction time order representation. Further when the representation width of the material data in the reproduction time order representation is varied, the indication is altered according to the operation, and when the indication is varied, the representation width of the material is altered according to the operation.

【0013】

【EMBODIMENT MODE OF THE INVENTION】

Referring to the drawings, the invention will now be described in detail with reference to embodiments according to the invention. Fig. 1 shows an entire configuration of contents-editing system for editing the contents such as the contents for audio and/or video. An imaging apparatus 10 generates image data having its frame rate variably set and combines associated information including frame rate information on the frame rate of the image data with this image data to supply an editing apparatus 30 with the combined ones as material data DTm. When the imaging apparatus 10 is provided with an audio input apparatus 20, it generates audio data to supply the editing apparatus 30 with the audio data and the associated information as material data DTm. The material data DTm may be also supplied from an apparatus, not shown, other than the imaging apparatus 10. The combination is enough if the image data and the associated information including the frame rate information are linked with each other. Thus, if they are recorded on different recording media or supplied through different transmission lines, a connection between them may be established latter when they includes a frame number and the like

corresponding to the association information. In this embodiment, the combination includes such the case.

【0014】

5 The editing apparatus 30 receives the material data DTm from the imaging apparatus 10 and performs editing process on the received material data DTm to produce and transmit contents-data DC. The editing apparatus 30 also produces image signal Svm concerning the editing and supplies an editing-image-displaying apparatus 40 with it. This allows a user to verify editing processes and results of image and the like through displayed images on the editing-image-displaying apparatus 40. Similarly, the editing
10 apparatus 30 produces audio signal Sam concerning the editing and supplies an editing-audio-transmitting apparatus 41 with it. This allows a user to verify editing processes and results of audio and the like through transmitted audio from the editing-audio-transmitting apparatus 41.

【0015】

15 Fig. 2 is a block diagram showing a configuration of the imaging apparatus 10. Imaging unit 12 receives incident light through imaging lens system 11 and an image pickup device such as charge coupled device (CCD) mounted within the imaging unit 12 captures subject image on its image surface. The image pickup device generates imaged charge of the subject image through photoelectric transfer characteristics thereof. The
20 imaging unit 12 also reads out the imaged charge thus generated on the basis of driving signal CR from a timing generator 142, which will be described later, and generates imaged signal Sp having a frame rate that corresponds to the driving signal CR to supply camera processing circuit 131 in signal processor 13 with the imaged signal Sp.

【0016】

25 Based on timing signal CT received from the timing generator 142, the camera processing circuit 131 performs various signal processing at timings synchronized with the imaged signal Sp. Illustratively, such the signal processing represents noise-reduction processing for reducing noise components from the imaged signal Sp by means of

correlated dual sampling or the like, transformation processing from the imaged signal Sp thus noise-reduced to digital image data, clamp processing of the image data, processing on shading correction and pilling-up of deficiency in the image pickup device, γ correction, contour enhancement processing, knee correction, and the like. Further, the camera
5 processing circuit 131 performs other various signal processing under the process conditions based on the operation control signal CS received from imaging control circuit 141 of controller 14. Thus, the camera processing circuit 131 generates image data DV according to various signal processing and supplies transmitting unit 15 with the image data DV.

10 **【0017】**

The timing generator 142 of controller 14 generates driving signal CR corresponding to operation control signal CS from the imaging control circuit 141 and supplies the imaging unit 12 with the driving signal CR, thereby allowing a reading-out frequency of imaged charge in the imaging unit 12 to be altered. It, then, also controls a
15 frame rate of the imaged signal Sp to be set to a set frame rate FRs based on an operation signal PSa from user interface unit 16. For example, frame frequency, 59.94Hz or 29.97Hz in the case of NTSC system or frame frequency, 50Hz or 25Hz in the case of PAL system is set to the frame frequency of reference frame rate FRr and an operation such that the set frame rate FRs is set to the n times the reference frame rate FRr is carried out. If so, a
20 frame rate of the imaged signal Sp is controlled to be equal to the n times the reference frame rate FRr.

【0018】

The timing generator 142 also generates the timing signal CT synchronized with the driving signal CR and supplies the camera processing circuit 131 and audio processing
25 circuit 132 with the timing signal CT. The timing generator 142 further generates associated information DM including the set frame rate FRs that is frame rate of image data DV and supplies the transmitting unit 15 with the frame rate information DM.

【0019】

The imaging control circuit 141 of the controller 14 is connected with the user interface unit 16. When the imaging apparatus 10 performs switching operation and alteration operation of the frame rate, the user interface unit 16 generates operation signal PSa corresponding to these operations and supplies the imaging control circuit 141 with the operation control signal PS. When receiving the operation signal PSa from external equipment such as a remote controller, not shown, the user interface unit 16 also supplies the imaging control circuit 141 with the operation signal PSa.

【0020】

The imaging control circuit 141 generates operation control signal CS to allow the imaging apparatus 10 to be operated according to the operation signal PSa based on the operation signal PSa received from the user interface unit 16. It also supplies the camera processing circuit 131 and the timing generator 142 with the operation control signal CS.

【0021】

The audio processing circuit 132 receives analog audio signal Sin from the audio input apparatus 20. The audio processing circuit 132 also performs sampling process on the analog audio signal Sin based on timing signal CT received from the timing generator 142 to generate digital audio data DA and supply the transmitting unit 15 with the digital audio data DA.

【0022】

The transmitting unit 15 combines the image data DV and the audio data DA with the associated information DM to generate material data DTm. The transmitting unit 15 supplies the editing apparatus 30 with the material data DTm. When the material data DTm or a recording signal produced on the basis of the material data DTm is recorded on recording medium, the material data DTm may be supplied to the editing apparatus 30 by reproducing the material data DTm itself or recorded on the recording medium in the editing apparatus 30.

【0023】

It is conceivable that as a way to combine the image data DV and the audio data DA with the associated information DM, the associated information DM is inserted into a data stream of image or a header of the data stream when the image data DV and the audio data DA are compressed to generate the material data DTm as the data stream.

5

【0024】

Further, it is conceivable that when SDI format standardized as SMPTE (Society of Motion Picture and Television Engineers) 259M, Television-10-Bit 4:2:2 Component and 4fsc Composite Digital Signals-Serial Digital Interface, in order to transfer non-compressed image and audio data, SDTI format standardized as SMPTE 305M, Television-Serial Data Transport Interface (SDTI), in order to transfer compressed image and audio data, or SDTI-CP format standardized as SMPTE 326M, Television-SDTI Content Package Format (SDTI-CP) that obtained by further defining SDTI format is utilized, the associated information DM may be inserted into a signal having each format as UMID data standardized as SMPTE 330M, Television-Unique Material Identifier (UMID).

15

【0025】

The above imaging apparatus 10 alters read-out frequency of imaged charge in the imaging unit 12 to generate the imaged signal Sp of a predetermined set frame rate FRs. If, however, the imaging apparatus 10 alters no read-out frequency of imaged charge in the imaging unit 12, the imaged signal Sp of the set frame rate FRs may be generated. This is, generating image data DVa having a constant frame rate higher than the set frame rate FRs and extracting image data of only the set frame rate FRs from the image data DVa allows the image data DVa of a predetermined set frame rate FRs to be generated. Fig. 3 shows a configuration of such a case. In Fig. 3, like reference numbers refer to like elements shown in Fig. 2 and thus, the detailed description thereof is omitted.

25

【0026】

Timing generator 182 in controller 18 generates driving signal CRA corresponding to the highest value of the set frame rate FRs that is set through user

interface unit 16 and supplies the imaging unit 12 with the driving signal CRa. Based on the driving signal CRa, the imaging unit 12 generates imaged signal Spa having a fixed frame rate FRq higher than a reference frame rate. The imaging unit 12 then supplies camera-processing circuit 131 with the imaged signal Spa. When the set frame rate FRs may be altered up to n times the reference frame rate FRr, the imaging unit 12 generates the imaged signal Spa having a frame rate n times the reference frame rate FRr, and supplies the camera processing circuit 131 with the imaged signal Spa.

【0027】

The timing generator 182 also generates timing signal CTa synchronized with the driving signal CRa and supplies the camera processing circuit 131 and audio processing circuit 132 in signal processor 17 and effective frame signal generation circuit 183 in the controller 18 with the timing signal CTa.

【0028】

The camera processing circuit 131 generates image data DVa of fixed frame rate FRq based on the imaged signal Spa and supplies the effective data selection circuit 171 with the image data DVa. The audio signal processing circuit 132 carries out a sampling based on the timing signal CTa of a fixed frequency to generate audio data DAa and supplies the effective data selection circuit 171 with the audio data DAa.

【0029】

Imaging control circuit 181 generates a set information signal CF indicating a set frame rate FRs based on operational signal PSa received from the user interface unit 16 and supplies the effective frame signal generation circuit 183 with the set information signal CF.

【0030】

The effective frame signal generation circuit 183 extracts data on a frame basis from the image data DVa based on a ratio of the fixed value of frame rate FRq of the image data DVa to a value of the set frame rate FRs indicated in the set information signal CF and generates extraction control signal CC for generating image data DV of the set

frame rate FRs. The effective frame signal generation circuit 183 also synchronizes the extraction signal CC with the timing signal CTa and supplies the effective data selection circuit 171 with the synchronized extraction control signal CC. When the frame rate FRq of the image data DVa is n times the reference frame rate FRr and the set frame rate FRs is n/2 times the reference frame rate FRr, the effective frame signal generation circuit 183 generates the extraction control signal CC for controlling data extraction on a frame basis every other frame from the image data DVa and supplies the effective data selection circuit 171 with the extraction control signal CC synchronized with the timing signal CTa. The effective frame signal generation circuit 183 further generates associated information DM having the set frame rate FRs as the frame rate information based on the set information signal CF and supplies the transmitting unit 15 with the associated information DM.

【0031】

The effective data selection circuit 171 extracts the image data DVa and the audio data DAa of the frame indicated by the extraction control signal CC and supplies the transmitting unit 15 with them as the image data DV and the audio data DA. It is conceivable that the effective frame signal generation circuit 183 may supply the effective data selection circuit 171 with the associated information DM including the set frame rate FRs as the frame rate information, and the effective data selection circuit 171 may perform frame-skipping on the audio data DAa according to a ratio of the set frame rate FRs to a frame rate when the audio data DAa is generated. When the frame rate FRq in generating the audio data DAa is n times the reference frame rate FRr and the set frame rate FRs is n/2 times the reference frame rate FRr, the effective data selection circuit 171 performs the frame-skipping on the audio data DAa every other sample. In this case, since an interval of the frame-skipping may be shortened as compared by a case where performing the frame-skipping on the audio data DAa on a frame basis, audio having an excellent sound quality may be get based on the audio data DA.

【0032】

Thus, the image data DVa having a fixed frame frequency makes unnecessary the alteration of operation frequencies in the imaging unit 12 and the camera processing circuit 131 of the signal processor 17. This allows configurations of the imaging unit 12 and the camera processing circuit 131 to be made simpler. Since only the data extraction on a frame basis from the image data DVa may generate image data DV of the set frame rate FRs, generating the image data DV of a predetermined set frame rate FRs from the image data DVa is easily allowed.

【0033】

When the imaging apparatus is provided with video memory or an adder and a divider, it may generate the image data DV by adding the image data every the predetermined frames. This allows a variable range of frame rate in the imaged signal Sp to be limited. Adding the imaged signal Sp of n frames and dividing the signal level by n allows the signal having a frame rate 1/n times the imaged signal Sp to be obtained even if a frame rate of the imaged signal Sp is not divided by n.

【0034】

Figs. 4 and 5 are diagrams showing relationship between the image data DV generated by the imaging apparatus 10, 10a and the associated information DM. When the set frame rate FRs is set to the one equal to or twice the reference frame rate FRr as shown in Fig. 4A, the associated information DM that includes the frame rate information DM-FRs indicating the set frame rate FRs, as shown in Fig. 4C, is combined with image data DV as shown in Fig. 4B (in Fig., frame images based on the image data DV are shown). Fig. 4D illustrates a relationship between time and the frame images. The frame rate information DM-FRs may include a magnification of the set frame rate FRs to the reference frame rate FRr in addition to the set frame rate FRs. The frame rate information DM-FRs is indicated by the magnification in Figs. 4C and Figs below.

【0035】

When the set frame rate FRs is set to the one equal to or half as much as the reference frame rate FRr as shown in Fig. 5A, the associated information DM that

includes the frame rate information DM-FRs indicating the set frame rate FRs, as shown in Fig. 5C is combined with image data DV as shown in Fig. 5B (in Fig. 5B, frame images based on the image data DV are shown). Fig. 5D illustrates a relationship between time and the frame images.

5 【0036】

The following will be described on the editing apparatus 30. Fig. 6 shows a configuration of the editing apparatus 30. In the editing apparatus 30 receiving material data DTm, an information detection circuit 311 in a material capture unit 31 receives the material data DTm. The information detection circuit 311 detects associated information DM from the material data DTm. The information detection circuit 311 supplies a database-processing circuit 312 with the associated information DM thus detected. The database-processing circuit 312 also receives image data DV and audio data DA included in the material data DTm.

15 【0037】

The database-processing circuit 312 records the image data DV, the audio data DA, and the associated information DM detected in the information detection circuit 311 on data recording apparatus 321 in edition processing unit 32 with the image data DV and the audio data DA being linked to the associated information DM. The database-processing circuit 312 generates database information DB that allows contents of material data to be easily verified on the basis of the associated information DM and the image data DV and the audio data DA linked to the associated information DM, which have been recorded on the data recording apparatus 321. The database-processing circuit 312 then supplies editing control unit 33 with the generated database information DB. The database information DB consists of pieces of information such as information for allowing contents of material data to be recognized (for example, thumbnails), a time length of the material data, set frame rate FRs, and recorded locations on the data recording apparatus 321.

25 【0038】

The editing control unit 33 generates image data DVg for allowing editing process to be carried out under graphical user interface (GUI) environment and image data DVi for allowing representation of contents of material data. The editing control unit 33 then supplies image-transmitting signal generation circuit 351 with the image data DVg and DVi. The image-transmitting signal generation circuit 351 generates image signal Svm based on the image data DVg, DVi thus supplied and transmits it to the editing-image-displaying apparatus 40. Thus, supplying the editing-image-displaying apparatus 40 with the image signal Svm allows information on what kind of the material data is recorded or the like to be displayed on a screen of the editing-image-displaying apparatus 40. This image signal Svm is used for image representation for editing.

[0039]

The editing control unit 33 also controls post-production process. User interface unit 34 that is connected with the editing control unit 33 supplies operational signal PSe to the editing control unit 33 using representation under GUI environment. When the operational signal PSe indicates the selection of any kind of the material data, the editing control unit 33 generates reading control signal RC according to the operational signal PSe. The editing control unit 33 then supplies write/read processing circuit 322 in the edition processing unit 32 with the reading control signal RC. When the operational signal PSe relates to editing operation such as processing and linkage of the material data thus read, the editing control unit 33 generates editing control signal ET according to the operational signal PSe. The editing control unit 33 then supplies signal editing circuit 323 in the edition processing unit 32 with the editing control signal ET. If editing of the material data is finished to bring contents-data to completion, the editing control unit 33 generates writing control signal WC according to the operational signal PSe when the operational signal PSe indicates recording operation of the contents-data on the data recording apparatus 321. The editing control unit 33 then supplies write/read processing circuit 322 with the writing control signal WC. The editing control unit 33 also generates transmitting control signal RP according to the operational signal PSe when the operational signal PSe

indicates data transmission of the contents-data. The editing control unit 33 then supplies the write/read processing circuit 322 with the transmitting control signal RP. The editing control unit 33 also generates speed range setting signal LP according to the operational signal PSe when the operational signal PSe specifies reproduction speed range of the contents-data. The editing control unit 33 then supplies the signal editing circuit 323 with the speed range setting signal LP.

【0040】

Based on the reading control signal RC, the write/read processing circuit 322 reads required material data out of the data recording apparatus 321 to supply the signal editing circuit 323 with it. Based on the writing control signal WC, the write/read processing circuit 322 also writes the complete contents-data on the data recording apparatus 321. Based on the transmitting control signal RP, the write/read processing circuit 322 reads required contents-data DC out of the data recording apparatus 321 to transmit it.

【0041】

The signal editing circuit 323 performs editing process such as processing, linkage, and deletion of image and audio data based on the editing control signal ET using the image data DV and the audio data DA included in the material data read out of the data recording apparatus 321. In this case, the signal editing circuit 323 supplies the image-transmitting signal generation circuit 351 with the image data DVe before, during or after the editing thereof. The signal editing circuit 323 also supplies the audio-transmitting signal generation circuit 352 with the audio data DAe before, during or after the editing thereof. When frame rates of image and audio data are altered according to the editing process, the signal editing circuit 323 alters the associated information DM together with the edited image and audio data. The signal editing circuit 323 further combines the associated information DMc corresponding to the edited image data DV and the edited audio data DA with the edited image data DV and the edited audio data DA to generate the contents-data DC. When the signal editing circuit 323 receives the speed

range setting signal LP, the signal editing circuit 323 also combines speed range information on the reproduction speed range of the contents-data DC as the associated information DMc based on the speed range setting signal LP. When the signal editing circuit 323 receives information on title and recommended reproduction speed of the contents from the user interface unit 34, the signal editing circuit 323 also combines the information as the associated information DMc. When the signal editing circuit 323 receives information on a reproduction time length of the contents-data according to the editing process, the signal editing circuit 323 may combine this information as the associated information DMc. When the signal editing circuit 323 receives information on the highest reproduction speed available for reproduction of the contents-data, the signal editing circuit 323 may combine the information on the highest reproduction speed as the associated information DMc.

【0042】

The image-transmitting signal generation circuit 351 of edited transmitting signal generation unit 35 generates image signal Svm based on the image data DVg, DV_i supplied through the editing control unit 33 and transmits it to the editing-image-displaying apparatus 40, as described above. This allows information on the material data to be displayed under GUI environment. Generating the image signal Svm based on the image data DV_e received from the signal editing circuit 323 allows image before, during or after the editing thereof to be verified on the screen of the editing-image-displaying apparatus 40.

【0043】

The audio-transmitting signal generation circuit 352 transfers the audio data DAe received from the signal editing circuit 323 to analog audio signal Sam and brings it to a desired signal level to supply the editing-audio-transmitting apparatus 41 composed of a speaker, a head hone, and the like with it. This allows audio before, during or after the editing thereof to be verified through audio transmitted from the editing-audio-transmitting apparatus 41.

【0044】

Thus, when the contents-data Dc is complete in the editing apparatus 30 according to the post-production process using the material data DTm, the editing apparatus 30 transmits the complete contents-data DC.

5 【0045】

The following will be described on operations of the editing apparatus 30. Fig. 7 illustrates GUI representation displayed on the editing-image-displaying apparatus 40 for an editing operation. In the GUI representation, a material administration browser window 401 for displaying a list of items of the material data as material administration display is provided at an upper-left side thereof; a story board window 402 for displaying items of the material data arranged in a reproduction order to create the contents as reproduction order display is provided at an lower-left side thereof; a monitor viewer window 403 for displaying an image before or after the editing process as reproduced image display is provided at an upper-right side thereof; and a time line window 404 for allocating the material data along a time axis to create the contents as reproduction time order display is provided at a lower-left side thereof. An operation control portion 405 is provided between the monitor viewer window 403 and the time line window 404. Locations and sharps of the material administration browser window 401, the story board window 402, the monitor viewer window 403, the time line window 404, and the operation control portion 405 are respectively illustrative ones and thus, of course, they are not limited to the above locations and sharps.

15 【0046】

The material administration browser window 401 shows a list of items of the material data stored in the data recording apparatus 321. For each item of the material data, a stamp view (a thumbnail view) for indicating a title, a length, contents of items of the stored material data, a speed range available for reproduction wherein noise-less natural image may be reproduced, and the like are shown.

25 【0047】

The story board window 402 serves as a working area for a creation of contents. Arranging the items of material data on the reproduced order allows the contents to be created. The story board window 402 also display a speed range available for reproduction.

5 The monitor viewer window 403 represents not only an image based on the material data but also a variable speed bar for indicating a speed range available for reproduction and a location of reproduction speed within the speed range.

【0048】

10 The time line window 404 serves as a working area for a production of contents according to a more detailed method to allocate items of the material data along a time axis. The time line window 404 also alters an indicated width of the material data according to a reproduction time calculated based on the production speed. The operation control portion 405 represents an operation key for reproducing the items of material data and the contents arranged on the time line window 404.

15 【0049】

Based on the represented GUI images and the operational signal PSe received from the user interface unit 34, the editing control unit 33 determines whether or not a drag-and-drop operation, a key-in operation in the operation control portion 405, and the like are carried out. If the editing control unit 33 determines that the drag-and-drop operation and the like have been carried out, it controls operations of the editing apparatus 20 30 according to such the drag-and-drop operation and the like.

【0050】

Fig. 8 is a flowchart showing a display control at the editing operation. At step ST11, the editing apparatus 30 determines whether or not the processing of the material data is requested. If no processing of the material data is requested, the process goes back 25 to the step ST11. If the processing of the material data is requested, the process goes to step ST12.

【0051】

At step ST12, the editing apparatus 30 determines whether or not frame rate information DM-FRs indicating the set frame rate FRs is obtained from the material data to be edited. When the editing apparatus 30 determines that no frame rate information DM-FRs indicating the set frame rate FRs is obtained from the material data referring to the database information DB, the process goes to the step ST13 where the editing apparatus 30 performs display controls so that the material data has same reproduction speed as a normal reproduction speed. When the editing apparatus 30 determines that the frame rate information DM-FRs is obtained from the material data, the process then goes to step ST14.

【0052】

At step ST14, a speed available for reproduction is set based on the set frame rate FRs indicated by the frame rate information DM-FRs. This speed is set so that a noise-less natural reproduction image can be realized through a frame-skipping of a predetermined frame period or a frame repetition. If a multiple of the set frame rate FRs to the reference frame rate FRr is more than one, namely, $FRs/FRr > 1$, the speed available for reproduction is set by searching for the divisors of this multiple other than one and calculating the reciprocals of the searched divisors. If the set frame rate FRs is 10 times the reference frame rate FRr, the divisors of this multiple, 10 other than one are of 2, 4, 5, and 10 and thus, the reciprocals thereof are of 1/2, 1/4, 1/5, and 1/10, respectively. Selection of one of the reciprocals of divisors allows the speed available for reproduction to be set to less than the same reproduction speed as normal reproduction speed. When the speed available for reproduction not less than the same reproduction speed as the normal reproduction speed is set to positive integer multiples of the normal reproduction speed, the frame-skipping periods in each of the speeds available for reproduction may be equal to each other. An upper limit of the speed available for reproduction is set to a speed available for grasping the contents of material data easily.

【0053】

If a multiple of the set frame rate FRs to the reference frame rate FRr is less than

one, namely, $FRs/FRr < 1$, the speed available for reproduction is set by searching for the reciprocals of this multiple and calculating the divisors of the searched reciprocals other than one or integer multiples of the searched reciprocals. If the set frame rate FRs is $1/6$ times the reference frame rate FRr , the divisors of the searched reciprocals other than one are of 2, 3, and 6 and the integer multiples of the reciprocals are of 6, 12, 18, ---, respectively. Selection of one of them allows the speed available for reproduction to be set. This allows frame-skipping periods or numbers of the frame repetitions in each of the speeds available for reproduction may be equal to each other. The speed available for reproduction of less than the same speed as the normal reproduction speed is set to the one/positive multiples the normal reproduction speed. This allows numbers of the frame repetitions in each of the speeds available for reproduction to be equal to each other. Since, however, this is concerned with a repetition of images, a lower limit of the speed available for reproduction may be set to the same reproduction speed as the normal reproduction speed.

【0054】

At step ST15, the editing apparatus 30 performs display control corresponding to the frame rate information DM- FRs , namely, to display so that it can be determined that the material data is combined with the frame rate information DM- FRs indicating the set frame rate FRs , as the associated information, and to display the speed range available for reproduction set based on the set frame rate FRs . For example, in the material administration browser window 401 and the story board window 402, in order to easily determine that the material data is combined with the frame rate information DM- FRs , a contour, a color, and the like of a frame of stamp view 401a, 402a are made different from them of the material data that is not combined with the frame rate information DM- FRs . When an information-representing regions 401b, 402b each for representing information on the material are provided, the speeds available for reproduction set in step ST14 are displayed in each of the regions. For example, in Fig.7 and Figs.9, which will be described later, when the material data is combined with the frame rate information DM- FRs , the

frame having its enlarged width is displayed and the speed range available for reproduction is indicated as being "x0.1 through x2.0".

【0055】

5 In the time line window 404, similar to the cases of the material administration browser window 401 and the story board window 402, it is possible to easily determine that the material data is combined with the frame rate information DM-FRs indicating the set frame rate FRs, as the associated information. For example, a contour, and a color of a frame of frame image representation region 404a are made different from them of the material data that is not combined with the frame rate information DM-FRs. In the time
10 line window 404, an operation is also carried out such that an indicated width of the frame image representation region 404a is adjusted along a horizontal direction, i.e., time axis direction thereof according to the set frame rate FRs. If the set frame rate is greater than the reference frame rate FRr, a number of frame images per unit of time increases. Thus, an indicated width of the frame image representation region 404a is enlarged along the
15 horizontal direction. If the set frame rate is smaller than the reference frame rate FRr, a number of frame images per unit of time decreases. Thus, an indicated width of the frame image representation region 404a is shortened along the horizontal direction. The monitor viewer window 403a is provided with a reproduction speed indication 403b and a console indication 403c for variable speed corresponding to the set speeds available for
20 reproduction in addition to material image view 403a based on the material data to display the reproduced image, the reproduction speed, and the speeds available for reproduction. At the same time, a sliding cursor 403d represented by a short bold line in the console indication 403c for variable speed is slid to a cursor position representing the reproduction speed. Thus, this allows the control direction to be determined.

25 【0056】

At step ST16, the editing apparatus 30 determines whether or not the reproduction speed is indicated via the user interface unit 34. When an operation is carried out such that the indicated width of the frame image representation region 404a is altered

or the sliding cursor 403d in the console indication 403c represented in the monitor viewer window 403 is slid, the process goes to step ST17. When no reproduction speed is indicated, the process goes back to step ST16.

【0057】

5 At step ST17, the editing apparatus 30 determines the indicated reproduction speed to display the reproduction speed thus determined. For example, when an operation such that the indicated width of the frame image representation region 404a is altered is carried out in the time line window 404, a reproduction speed is selected in sequence from the speeds available for reproduction set at step ST14 depending on the operational
10 direction to set the reproduction speed when completing the operation. When the sliding cursor 403d in the console indication 403c represented in the monitor viewer window 403 is slid, a reproduction speed is selected from the speeds available for reproduction set at step ST14 depending on a cursor position to set the selected speed to the reproduction speed.

15 **【0058】**

 When the reproduction speed is determined, the indicated reproduction speed is shown in the reproduction speed indication 403b of the monitor viewer window 403. When a reproduction speed is indicated according to the operation such that the indicated width of the frame image representation region 404a is altered with the sliding cursor
20 403d in the console indication 403c and the indicated width of the frame image representation region 404a being in synchronization with each other, the sliding cursor 403d in the console indication 403c represented in the monitor viewer window 403 is slid to a position corresponding to the indicated reproduction speed to display the reproduction speed. When a reproduction speed is indicated according to the operation such that the
25 sliding cursor 403d in the console indication 403c represented in the monitor viewer window 403 is slid, the indicated width of the frame image representation region 404a is altered to a width according to the corresponding reproduction speed. Thus, the sliding cursor 403d in the console indication 403c and the indicated width of the frame image

representation region 404a being in synchronization with each other allows the reproduction speed to be correctly altered using either of these two methods.

【0059】

At step 18, based on the indicated reproduction speed, the editing apparatus 30 calculates reproduction time when reproducing the material data at the indicated reproduction speed. For example, when the set frame rate FRs is 10 times the reference frame rate FRr, a slow speed available for reproduction is of any one of "1/10, 1/5, 1/4 and 1/2" of the normal reproduction speed. For example, if the reproduction time of the material is 30 seconds when the reproduction speed is the same speed as normal reproduction speed, the reproduction time when the reproduction speed is 1/10 times the normal reproduction speed is 300 seconds. The reproduction time when the reproduction speed is 1/5 times the normal reproduction speed is 150 seconds. Thus, multiplying the reproduction time when the reproduction speed is the same speed as normal reproduction speed by the reciprocal of the reproduction speed allows the reproduction time to be calculated.

【0060】

At step ST19, the editing apparatus 30 performs a display control according to the reproduction time thus calculated. For example, the indicated width of the frame image representation region 404a in the time line window 404 is altered according to the reproduction time calculated at step ST18, and the process goes back to step ST16. During reproduction operation of the material data, the reproduced image when reproducing the material data at the indicated reproduction speed is displayed as the monitor viewer window 403a for displaying the material image of the monitor viewer window 403.

【0061】

If the reproduction time on a scene of a part of the material data is altered, the scene is split and then, the above process is conducted on the split scenes, thereby allowing alteration of the reproduction time.

【0062】

Figs.9 are illustration each for GUI representation at an editing operation using the material data combined with the frame rate information DM-FRs indicating that, for example, the set frame rate FRs is 10 times the reference frame rate FRr. Fig. 9A illustrates the GUI representation where the reproduction speed is the same speed as the normal reproduction speed. Fig. 9B illustrates the GUI representation where the reproduction speed is a tenth the normal reproduction speed. Fig. 9C illustrates the GUI representation where the reproduction speed is twice as much as the normal reproduction speed. Concerning the material data combined with the information on the set frame rate FRs, a frame representation of viewer is carried out in such a way different from a case of the material data not combined with the frame rate information DM-FRs indicating the set frame rate FRs in the story board window 402 and the time line window 404.

【0063】

When reproducing the selected material data, the set frame rate FRs is determined on the basis of the frame rate information DM-FRs, and then, such a calculation that the reproduction speed FP multiplied by the set frame rate FRs equals a determined value FD is performed. Reproduction process conditions are determined on the determined value FD. When the reproduction speed is the same speed as the normal reproduction speed as shown in Fig. 9A and the set frame rate FRs is 10 times the reference frame rate FRr, the reproduction speed FP multiplied by the set frame rate FRs equals the determined value FD as $(1 \times 10 = 10)$. Fig. 10A illustrates images based on the image data DV where the set frame rate FRs is 10 times the reference frame rate FRr. Fig. 10B illustrates the frame rate information DM-FRs indicating the set frame rate FRs of each of the frame images. Fig. 10C illustrates the absolute frame numbers AN of the frame images.

【0064】

When the determined value FD is set to 10, namely, $FD=10$, as shown in Figs. 10D and 10E, the image signal Svm is generated using every 10 frames, namely, with the image data of nine frames being skipped. This allows reproduced image having same speed as the normal reproduction speed to be represented on the monitor viewer window

403 based on the image signal Svm. Fig. 10D illustrates the absolute frame numbers AN of the frame images. Fig. 10E illustrates frame images represented on the monitor viewer window 403a of the monitor viewer window 403 by the image signal Svm.

【0065】

5 An operation is carried out such that an indicated width of a frame image representation region 404a in the time line window 404 is enlarged along a direction indicated by an arrow A or a sliding cursor 403d represented by a short bold line in the console indication 403c for variable speeds is slid in a direction indicated by an arrow B. In this case, a processing as the slow motion of reproduction is performed. For example,
10 when the speed available for reproduction is set to 1/10 times the normal reproduction speed, a reproduction speed indication 403b in the monitor viewer window 403 is altered to "x 0.1" as shown in Fig. 9B. At the same time, the sliding cursor 404d is slid to a cursor position representing a tenth times the normal reproduction speed in the console indication 403c. Since the long reproduction time is required, the indicated width of the frame image
15 representation region 404a is also enlarged, as shown in Fig. 9B.

【0066】

 If the speed available for reproduction is set to 1/10 times the normal reproduction speed as shown in Fig. 9B, the determined value FD is set to one, namely, $FD=10 \times (1/10)=1$. When the determined value FD is set to one, namely, $FD=1$, the image
20 signal Svm is generated using every $FD=1$ frame of the image data DV, namely, without any frame being skipped. This allows the reproduced images having a tenth times the normal reproduction speed to be represented on the monitor viewer window 403a of the monitor viewer window 403 based on the image signal Svm, as shown in Fig. 10A.

【0067】

25 An operation is carried out such that an indicated width of the frame image representation region 404a in the time line window 404 is shortened along a direction indicated by an arrow B or a sliding cursor 404d in the console indication 403c is slid on a direction indicated by an arrow A in the monitor viewer window 403. In this case, a

processing as the quick motion of reproduction is performed. For example, when the speed available for reproduction is set to twice as much as the normal reproduction speed, a reproduction speed indication 403b in the monitor viewer window 403 is altered to "x 2.0" as shown in Fig. 9C. At the same time, the sliding cursor 403d is slid to a cursor position representing twice of the normal reproduction speed in the console indication 403c. Since the short reproduction time is required, the indicated width of the frame image representation region 404a is shortened, as shown in Fig. 9C.

【0068】

If the speed available for reproduction is set to twice of the normal reproduction speed as shown in Fig. 9C, the determined value FD is set to 20, namely, $FD=10 \times 2=20$. When the determined value FD is set to 20, namely, $FD=20$, the image signal Svm is generated using every 20 frames, namely, with the image data of nineteen frames being skipped. This allows the reproduced images having twice speed as much as the normal reproduction speed to be represented on the monitor viewer window 403 based on the image signal Svm, as shown in Figs. 10F and 10G. Fig. 10F illustrates the absolute frame numbers AN of the frame images. Fig. 10G illustrates frame images represented the monitor viewer window 403a of the monitor viewer window 403 by the image signal Svm.

【0069】

Thus, the noise-less slow reproduction may be easily realized using the frame rate information DM-FRs and frame-skipping on a frame basis based on the reproduction speed. An operation for altering reproduction speed may be realized during the reproduction process, so the reproduced image may be verified at a desired reproduction speed at easy.

【0070】

Since the reproduction speed and the indicated width are displayed with them being linked with each other, a relationship between the reproduction speed and the expands and contracts of time axis may be easily grasped, thereby allowing the editing operation to be easily conducted. Further, when the frame image representation region

404a is provided with an indication for indicating a direction where the indicated width of the frame image representation region 404a can be altered, namely, a direction where the reproduction speed can be altered, for example, an arrow indication illustrated by the dotted lines in Figs. 9, it is possible to find out the direction where the reproduction speed can be altered, at easy.

5 【0071】

Fig. 11 is a flowchart showing an editing process operation using the GUI representation for the performing display control, for example, the one shown in Fig. 8, and for the editing, for example, the one shown in Fig. 9. At step ST21, the editing apparatus 30 captures the material data. It then records the captured material data on the data recording apparatus 321 and generates the database information DB.

10 【0072】

At step ST22, the editing apparatus 30 displays the contents of the captured material data using the database information DB. Displaying the contents of the captured material data is carried out so that the material administration browser window 401 may display a stamp view and information of the captured material data. When any material data displayed on the material administration browser window 401 is selected, the monitor viewer window 403 displays image of the selected material data. When a reproduction control key operation is done in the operation control portion 405 provided between the monitor viewer window 403 and the time line window 404, the editing apparatus 30 reproduces the material data, stops the reproduction, and reproduces the material at various speeds, according to the key operation and then the monitor viewer window 403 displays the reproduced image.

15 【0073】

At step ST23, the editing apparatus 30 determines whether or not the material data is selected. If the material data is not selected, the process goes back to step ST23. If the material data is selected, the process goes to step ST24. When the material data is selected so that a drag-and-drop is done from the material administration browser window

401 to the time line window 404, the process goes to step ST24.

【0074】

At step ST24, the editing apparatus 30 arranges frame images generated based on the selected material data in an imaged time order and displays them on the frame image representation region 404a of the time line window 404.

【0075】

At step ST25, the editing apparatus 30 processes the material data according to various editing operations such as cut and paste or replacement of the frame images displayed on the time line window 404. The editing apparatus 30 then generates desired image and audio data to create the contents-data. Alternatively, the editing apparatus 30 combines the associated information DMc indicating the set frame rate and the like with the image and audio data to create the contents-data.

【0076】

At step ST26, the editing apparatus 30 performs various completion processes on the contents-data created at step ST25 such as process on bridges of the material data, addition enhancement of effects, and synthesis of image and audio to be added. At step ST27, the editing apparatus 30 performs transmitting process on the contents-data. That is, the editing apparatus 30 transmits the complete contents-data as program data for broadcasting to a program-sending apparatus. Alternatively, it transmits the complete contents-data as contents-data for distribution to a contents-sending apparatus. The editing apparatus 30 performs authoring process such as addition of information for carrying out a special reproduction and the like to the complete contents-data, the special reproduction corresponding to a menu list for reproducing the contents or a reproduction menu. The editing apparatus 30 then records the data thus authored on the recording medium.

【0077】

The above editing process by the editing apparatus 30 may be also realized through a software process using a computer. Fig. 12 shows a configuration of a contents-editing system for editing contents by means of software.

【0078】

The computer builds in a central processing unit (CPU) 381 as shown in Fig. 12. ROM 382, RAM 383, data storage unit 384 composed of hard disk drive with a large storage capacity and the like, and an input/output interface 385 are connected with the CPU 381 via bus 390. Signal-receiving unit 391, signal-transmitting unit 392, and recording medium drive 393 are connected with the input/output interface 385.

【0079】

The CPU 381 run programs stored on the ROM 382, the RAM 383 or the data storage unit 384 to perform the editing processes as shown in Fig. 8 and Fig. 11. The data storage unit 384 stores material data, which the signal-receiving unit 391 receives, via the input/output interface 385 and the bus 390. Material data to be used for editing is read from the material data stored on the data storage unit 384, and the editing process is performed using it to store the complete contents-data on the data storage unit 384 again. The complete contents-data stored on the data storage unit 384 is read out and transmitted through the signal-transmitting unit 392.

【0080】

It is conceivable that a program for performing the editing process may be previously stored on the ROM 382 or the data storage unit 384. A program for performing contents-sending process stored on the recording medium or a program stored on the recording medium may be read out and run. A program may be transmitted through wired or wireless transmission line. A received program may be run in the computer.

【0081】

Thus, according to the embodiments, the material data that is combined with the frame rate information as the associated information and not combined with the frame rate information is displayed, respectively, so that the material data can be determined. This allows a scene available for reproducing a slow motion image to be easily found out using the frame rate information of the material data. A speed range available for reproduction is displayed on the basis of the associated information, thereby allowing a variable speed

reproduction to be realized setting a speed within the speed range. This permits effects of image expression to be easily enhanced.

【0082】

5 The editing apparatus 30 may also provide the contents having a wide speed range available for reproduction using the material data effectively if it may generate the contents-data without any frame rate of the material data being reduced.

【0083】

【EFFECT OF THE INVENTION】

10 According to the invention, a material data is captured, editing process is carried out using the material data captured, in the editing process image is displayed based on the material data captured or the material data on the editing process, in the editing image the material data that is combined with the frame rate information as the associated information and not combined with the frame rate information as the associated information with said items of the material data being distinguished from each other is
15 displayed. Thus it is easy to find scene that can be reproduce slowly using the frame rate information on the material data.

【0084】

A speed range available for reproduction is set on the material data based on the associated information, and the determined display speed range available for reproduction
20 is displayed. Thus it is easy to set the reproduction that can be reproduced without noise. And, a reproduction time order representation to allocate the material data along a time axis to create contents is provided and a representation width of the material data being altered according to reproduction time calculated on the basis of the reproduced speed in said reproduction time order representation. Thus expansion and contraction of time axis
25 can be caught visually. Further, when the representation width of the material data in the reproduction time order representation is varied, the indication is altered according to the operation; and when the indication is varied, the representation width of said material is altered according to the operation. Thus the relation between the reproduction speed and

the expansion and contraction of time axis can be caught easily.

【BRIEF DESCRIPTION OF THE DRAWINGS】

【FIGURE 1】 Fig. 1 is a diagram for illustrating a whole configuration of contents-editing system;

5 **【FIGURE 2】** Fig. 2 is a block diagram showing a configuration of imaging apparatus;

【FIGURE 3】 Fig. 3 is a block diagram showing a configuration of another imaging apparatus;

【FIGURE 4】 Figs. 4 are diagrams showing relationship (part 1) between the image data and the associated information;

10 **【FIGURE 5】** Figs. 5 are diagrams showing relationship (part 2) between the image data and the associated information;

【FIGURE 6】 Fig. 6 is a block diagram showing a configuration of an editing apparatus;

15 **【FIGURE 7】** Fig. 7 is an illustration for GUI representation at an editing operation;

【FIGURE 8】 Fig. 8 is a flowchart showing a display control at the editing operation;

【FIGURE 9】 Figs. 9 are illustrations each for GUI representation at an editing operation;

20 **【FIGURE 10】** Figs. 10 are illustrations showing a reproduction operation of the image;

【FIGURE 11】 Fig. 11 is a flowchart showing an editing process operation; and

【FIGURE 12】 Fig. 12 is an illustration illustrating a configuration of a contents-editing system for editing contents by means of software.

25 **【EXPLANATION OF CODES】**

10,10a Imaging apparatus

12 Imaging unit

13,17 Signal processor

	14,18	Controller
	15	Transmitting unit
	16,34	User interface
	20	Audio input apparatus
5	30	Editing apparatus
	31	Material capture unit
	32	Edition processing unit
	33	Editing control unit
	35	Edited transmitting signal generation unit
10	40	Editing-image-displaying apparatus
	41	Editing-audio-transmitting apparatus
	131	Camera processing circuit
	132	Audio processing circuit
	141,181	Imaging control circuit
15	142,182	Timing generator
	171	Effective data selection circuit
	183	Effective frame signal generation circuit
	311	Information detection circuit
	312	Database-processing circuit
20	321	Data recording apparatus
	322	Write/read processing circuit
	323	Signal editing circuit
	351	Image-transmitting signal generation circuit
	352	Audio-transmitting signal generation circuit
25	384	Data storage unit
	391	Signal-receiving unit
	392	Signal-transmitting unit
	401	Material administration browser

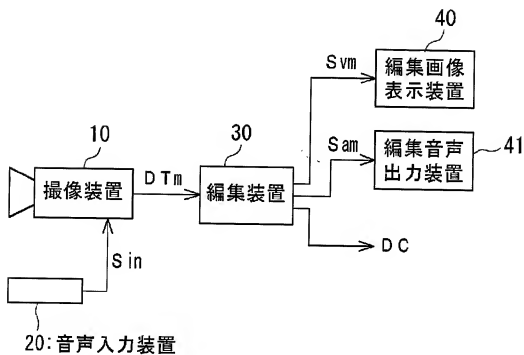
Application No.2002-332650

- 402 Story board window
- 403 Monitor viewer window
- 404 Time line window
- 405 Operation control portion

【書類名】 図面

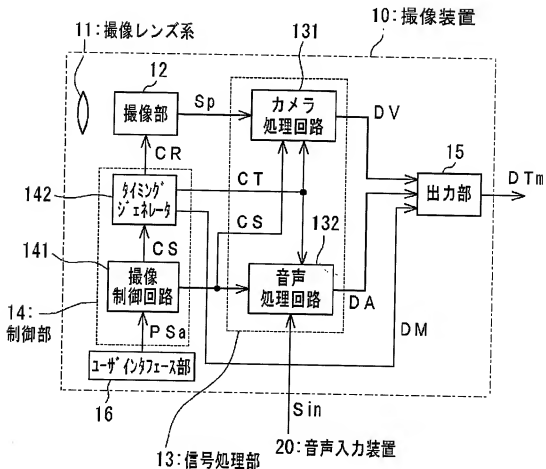
【図 1】

コンテンツ編集システム



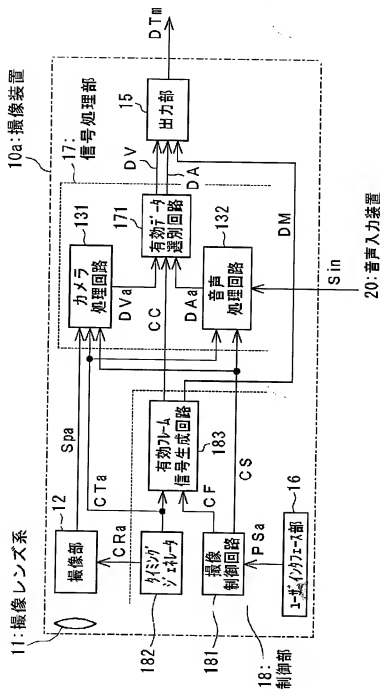
【図2】

撮像装置の構成



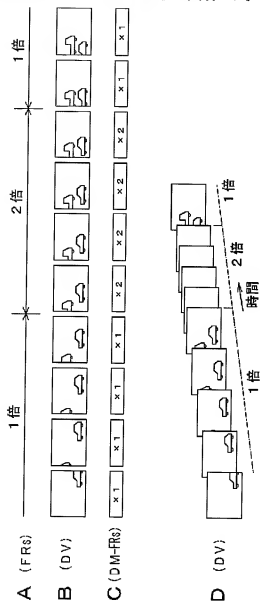
【図3】

撮像装置の他の構成



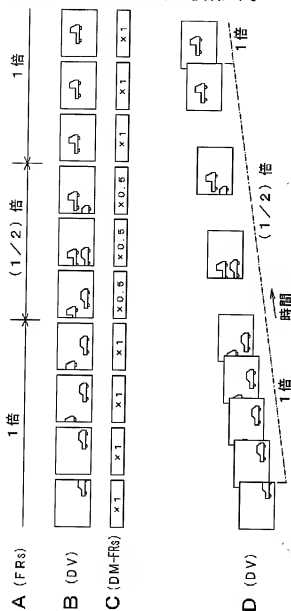
【図4】

映像データと付属情報の関係(その1)



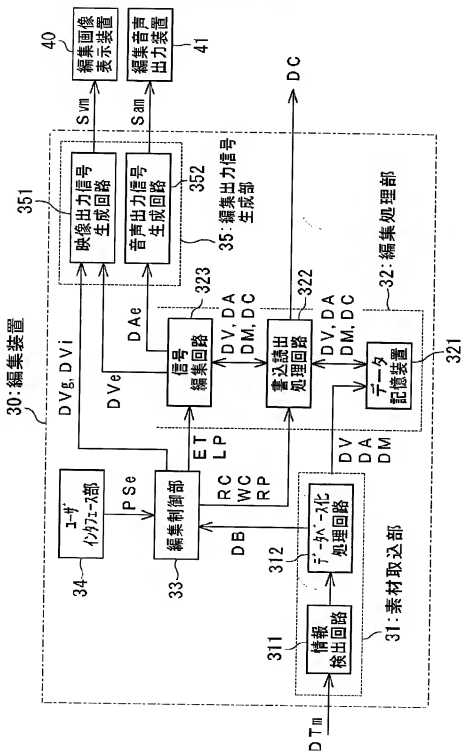
【図5】

映像データと付属情報の関係 (その2)



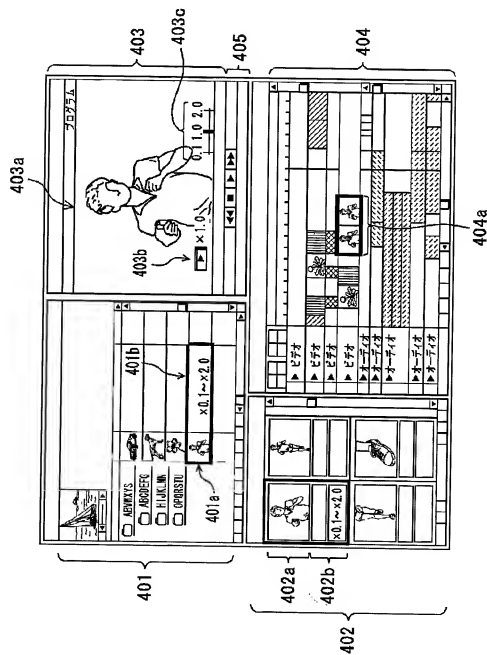
【図6】

編集装置の構成



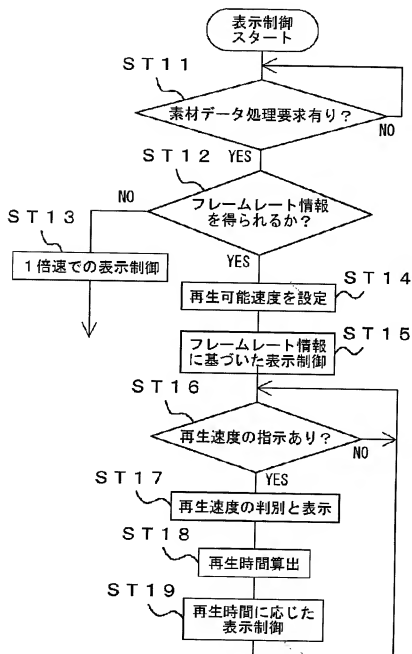
【図 7】

編集操作のための G U I 画面



【図 8】

編集動作時の表示制御



03c



○ 蝦蟇 (2)



A

B

B

A

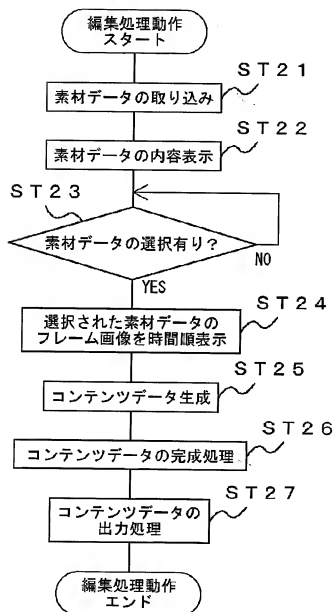
(1倍速)

01

(0.1倍速)

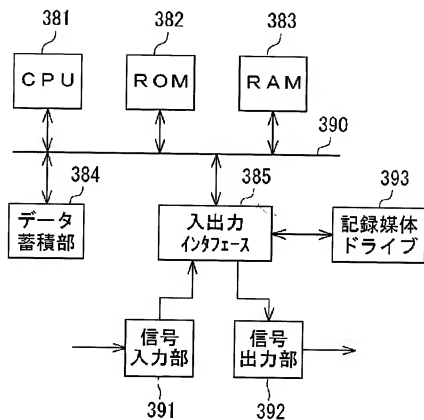
【図 11】

編集処理動作



【図 1 2】

ソフトウェアで編集処理を行う場合の構成



【書類名】 図面

[NAME OF DOCUMENT] DRAWINGS

【図 1】

FIGURE 1

コンテンツ編集システム

Contents-editing system

撮像装置

Imaging apparatus

5

編集装置

Editing apparatus

編集画像表示装置

Editing-image-displaying apparatus

編集音声出力装置

Editing-audio-transmitting apparatus

音声入力装置

Audio input apparatus

10

【図 2】

FIGURE 2

撮像装置の構成

Configuration of imaging apparatus

撮像装置

Imaging apparatus

撮像レンズ系

Imaging lens system

撮像部

Imaging unit

15

制御部

Controller

タイミングジェネレータ

Timing generator

撮像制御回路

Imaging control circuit

ユーザインターフェース部

User interface unit

カメラ処理回路

Camera processing circuit

20

音声処理回路

Audio processing circuit

出力部

Transmitting unit

信号処理部

Signal processor

音声入力装置

Audio input apparatus

25

【図 3】

FIGURE 3

撮像装置の他の構成

Configuration of another imaging apparatus

撮像装置

Imaging apparatus

撮像レンズ系

Imaging lens system

撮像部

Imaging unit

30

信号処理部

Signal processor

制御部

Controller

タイミングジェネレータ

Timing generator

	撮像制御回路	Imaging control circuit
	ユーザインターフェース部	User interface unit
	有効フレーム信号生成回路	Effective frame signal generation circuit
	カメラ処理回路	Camera processing circuit
5	有効データ選別回路	Effective data selection circuit
	音声処理回路	Audio processing circuit
	出力部	Transmitting unit
	音声入力装置	Audio input apparatus
10	【図4】	FIGURES 4
	映像データと付属情報の関係（その1）	Relationship (part 1) between the image data and the associated information
	1 倍	Normal speed
	2 倍	Twice speed
15	時間	Time
	【図5】	FIGURES 5
	映像データと付属情報の関係（その2）	Relationship (part 2) between the image data and the associated information
20	1 倍	Normal speed
	1 / 2 倍	Half speed
	時間	Time
	【図6】	FIGURE 6
25	編集装置の構成	Configuration of an editing apparatus
	編集装置	Editing apparatus
	素材取込部	Material capture unit
	編集処理部	Edition processing unit
	編集制御部	Editing control unit
30	ユーザインターフェース部	User interface unit
	編集出力信号生成部	Edited transmitting signal generation unit
	編集画像表示装置	Editing-image-displaying apparatus

	編集音声出力装置	Editing-audio-transmitting apparatus
	情報検出回路	Information detection circuit
	データベース化処理回路	Database-processing circuit
	データ記憶装置	Data recording apparatus
5	書込読出処理回路	Write/read processing circuit
	信号編集回路	Signal editing circuit
	映像出力信号生成回路	Image-transmitting signal generation circuit
	音声出力信号生成回路	Audio-transmitting signal generation circuit
10	【図 7】	FIGURE 7
	編集操作のための G U I 画面	Illustration for GUI representation at an editing operation
	ビデオ	Video
	オーディオ	Audio
15	プログラム	Program
	【図 8】	FIGURE 8
	編集動作時の表示制御	Display control at the editing operation
	表示制御スタート	Start of display control
20	素材データ処理要求有り？	Is processing of material data requested?
	フレームレート情報を得られるか？	Is frame rate information obtained?
	1 倍速での表示制御	Perform display control so that material data has normal reproduction speed
	再生可能速度を設定	Set speed available for reproduction
25	フレームレート情報に基づいた表示制御	Perform display control based on frame rate information
	再生速度の指示あり？	Is reproduction speed is indicated?
	再生速度の判別と表示	Display determination of reproduction speed
	再生時間算出	Calculate reproduction time
30	再生時間に応じた表示制御	Perform display control according to the reproduction time

【図 9】

編集操作時の G U I 画面

1 倍速

0. 1 倍速

2 倍速

ビデオ

オーディオ

プログラム

FIGURES 9

GUI representation at an editing operation

Normal speed

1/10 times normal speed

Twice speed

Video

Audio

Program

10 【図 1 0】

画像再生動作

FIGURES10

Reproduction operation of the image

【図 1 1】

編集処理動作

編集処理動作スタート

素材データの取り込み

素材データの内容表示

素材データの選択有り？

選択された素材データのフレーム画像を時間順表示

selected material data in imaged time order

コンテンツデータ生成

コンテンツデータの完成処理

コンテンツデータの出力処理

編集処理動作エンド

FIGURE 11

Editing process operation

Start of editing process operation

Capture of material data

Display contents of material data

Is material data selected?

Arrange frame images of

Produce contents-data

Perform completion process on contents-data

Perform transmitting process on contents-data

End of editing process operation

【図 1 2】

ソフトウェアで編集処理を行う場合の構成
system for editing contents by means of software

データ蓄積部

入出力インターフェース

記録媒体ドライブ

信号入力部

FIGURE 12

Configuration of a contents-editing

Data storage unit

Input/output interface

Recording medium drive

Signal-receiving unit

Application No.2002-332650

信号出力部

Signal-transmitting unit

ABSTRACT

[SUMMARY]

5 **[OBJECT]** The editing process is carried out easily using material created on standard frame rate and material varied frame rate.

10 **[MEANS FOR SOLVING]** When an image is displayed on a material administration browser 401, a story board window 402 and a time line window 404 based on material data, the editing image display is controlled to display items of the material data that is combined with the frame rate information as the associated information and not combined with the frame rate information as the associated information with the items of the material data being distinguished from each other. When the material data is combined with the frame rate information as the associated information, a speed range available for reproduction of said material data is displayed based on the frame rate information. A console indication 403c in variable speeds for indicating a reproduction speed or for
15 altering the reproduction speed within the speed range available for reproduction is provided. Thus, reproduced image may be displayed on material image representation 403a at set reproduction speed.

[SELECTED DRAWING] Figure 7